DOCUMENT RESUME

ED 056 446 40 EC 040 487

AUTHOR Bologa, James F.; And Others
TITLE The Measurement and Comparison of Variables Related to Driver and Highway Safety Between Educable Mentally Retarded and Normal High School Age Students in Pennsylvania. Final Report.
INSTITUTION Millersville State Coll., Pa.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
BUREAU NO BR-48-2062
PUB DATE Feb 71
GRANT OEG-0-9-48-2062-1326(032)
NOTE 234p.

EDRS PRICE MF-$0.65 HC-$9.87
DESCRIPTORS *Driver Education; *Educable Mentally Handicapped; *Exceptional Child Research; Individual Characteristics; Mentally Handicapped; Perception; Perceptual Motor Coordination; Predictive Measurement; Safety Education; *Traffic Accidents; *Traffic Safety

ABSTRACT

The study was conducted to measure variables related to safe driving and to designate factors predictive of success in driving safety of educable mentally retarded (EMR) students as compared to normal students. Subjects were 349 EMR and 443 intellectually normal students (ages 16-20), who were evaluated in the following areas: visual acuity, visual organization, field of vision, depth perception, eye-hand coordination, class in school, residence, father's occupation, reaction time, and emotional maturity. Driving records (accidents and violations) were compared to test results. Findings showed the following factors related to accident and violation rate: age (for normals), weight (for normals and female EMRs), class in school (for both groups), city or suburban residence (for both groups), and higher skill level of father (for female EMRs and normals). Wearing of glasses for female EMRs was related to not having accidents; handedness was unrelated for both groups. Also reported were the relationship of the scores of the various tests administered to driving records. Scores related to having accidents were high visual acuity, low distance judgment (for EMRs), high field of vision, not having had Driver Education (for EMRs), and having had Driver Education (for female normals). (KW)

ED056446

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

SCOPE OF INTEREST NOTICE
The ERIC Facility has assigned this document for processing to: EC
In our judgement, this document is also of interest to the clearinghouses noted to the right. Indexing should reflect their special points of view. VT

FINAL REPORT

Project No. 48-2062

Grant No. OEG-0-9-48-2062-1326-(032)

THE MEASUREMENT AND COMPARISON OF VARIABLES RELATED TO DRIVER AND HIGHWAY SAFETY BETWEEN EDUCABLE MENTALLY RETARDED AND NORMAL HIGH SCHOOL AGE STUDENTS IN PENNSYLVANIA

Bologa, James F., M.Ed., Co-Principal Investigator
Kettering, W. Richard, Ed.D., Co-Project Director
Mullin, Raymond C., M.Ed., Co-Project Director
Strickler, Darryl J., M.Ed., Co-Principal Investigator

DEPARTMENT OF SPECIAL EDUCATION
MILLERSVILLE STATE COLLEGE
MILLERSVILLE, PENNSYLVANIA
February 1, 1971

EC 040 487E

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
U. S. OFFICE OF EDUCATION
BUREAU OF EDUCATION FOR THE HANDICAPPED

ACKNOWLEDGEMENTS

Any research project of this nature is the product of the contribution and efforts of numerous individuals and institutions, without whose assistance an endeavor of this magnitude could not be undertaken.

The authors are greatly indebted to the more than eight-hundred high school students throughout Pennsylvania who willingly served as subjects for the study, and to the administrators and teachers in the participating schools, who through their cooperation and assistance, made possible the collection of data for this study. While a listing of the school personnel would be too lengthy to include here, the contribution of these individuals is greatly appreciated.

The authors wish to express their gratitude to the various consultants who provided expert advice and assistant in the completion of this research project. They are especially indebted to Dr. Isadore Goldberg of Volt Information Sciences, for his contribution in statistics and data analysis. Also, Mr. Frank Sanel, Programmer for Computer Applications, Incorporated, played an invaluable role in the area of program selection and modification. To Dr. Barton Proger, Director of Evaluation and Dissemination of Pennsylvania Resources and Information Center for Special Education, a special debt is also due, for his consultive advice on research design, data reduction and analysis.

For the competent consultation and excellent electronics systems' design and development provided by Mr. H. Craig Miller, Electronics Technician for Radio Corporation of America, the investigators and directors of the project are greatly indebted. His contribution to the various mechanisms involved in the operation of the Situational Stress Test can not be overstated.

The efforts of Mr. William Koran and Mr. James Blackmore, (Educational Representatives for Link General Precision Systems) who were instrumental in arranging the lease and installation of the driving simulator used in the Situational Stress Test, are sincerely appreciated.

The authors wish to thank the following colleagues at Millersville State College, whose advice and assistance greatly aided the investigators in the completion of the research project: Dr. M. K. Hamid, Dean of the Social Sciences Division, Dr. Thomas Houser, Director of Computer Services, Dr. V. A. Champa and the Staff of the Educational Media Department. A special note of thanks is due to Mr. Edward Hall and his staff at the Millersville State College's Duplicating and Printing Shop, for their efforts in printing and putting together the final report.

Also, the authors wish to acknowledge the cooperation and assistance of Mr. William Gould, Director of Computer Services, Mr. William Snyder, Professor of Computer Science, and their associates of the Computer Center at Shippensburg State College who arranged for the use of the Center in handling the data analysis and assisted in the programming of the data for the study.

Various individuals and agencies of the Commonwealth of Pennsylvania provided invaluable aid to the project. The authors wish to express their gratitude to the following individuals of the Pennsylvania Department of Education for the assistance they gave to this research effort: Dr. William Ohrtman, Director, Bureau of Special Education, Mr. Joseph Lantzer, Supervisor, Programs for Mentally Retarded, Bureau of Special Education, Mr. Ray Fulmer, Coordinator and Safety Education Advisor, Bureau of General and Academic Education, and Mr. Dean Hartman, Director, Bureau of Educational Statistics.

Also, a note of thanks to Mr. Edward Hitchin, Commissioner, Bureau of Traffic Safety, Department of Revenue, Harrisburg, Pennsylvania and his staff members who compiled accident and violation information on the subjects of the study.

The acknowledgement of those individuals who assisted in this research endeavor would be incomplete without special recognition of Mr. Robert Maier, Supervisor of Special Education, Chester County Schools, and Mr. Barry Newill, Director of Education for Harrisburg State Hospital, who initiated the research proposal and conducted preliminary investigations prior to the funding of the project.

Finally, a special note of thanks to the project secretary, Mrs. Pearl Blantz, for the countless number of times she typed and edited various sections of this report.

TABLE OF CONTENTS

CHAPTER PAGE

Acknowledgements..... ii

Table of Contents..... iv

List of Tables..... xii

List of Figures..... xiv

Summary..... xv

I. INTRODUCTION

A. Introduction to Problem..... 1

B. Nature of Problem..... 2

C. Objectives of Investigation..... 3

D. Procedures..... 4

E. Analysis of the Data..... 7

F. Data Gathering Instruments Used..... 8

G. Fundamental Assumptions of the Investigators..... 11

H. Limitations to the Study..... 12

II. REVIEW OF THE LITERATURE

A. The Accident Problem..... 14

B. Summary of Accident Problem..... 16

C. Driver Education for EMRs..... 16

D. Summary of Driver Education for EMRs..... 21

E. Variables Involved in Safe Driving..... 21

F. Summary of Variables Involved in Safe Driving..... 24

CHAPTER PAGE

III. SAMPLING PROCEDURES AND TEST ADMINISTRATION

A. Soliciting Participation in the Study..... 25

B. Sampling Technique..... 26

C. Selection of Subjects..... 34

D. Size and Distribution of the Sample..... 35

E. Representativeness of the Sample..... 35

F. Test Administration..... 39

IV. RESULTS

A. Methods of Analysis..... 43

B. Description and Coding of Variables..... 45

C. Differences Among EMRs and Normals, Males and Females..... 53

D. Correlation Analysis..... 64

V. DISCUSSIONS

A. Review of the Problem..... 83

B. Patterns of Driving Behavior..... 84

C. Patterns of Accidents and Violations..... 85

D. Discussion of Independent Variables with Criterion Variables..... 89

VI. SUMMARY, CONCLUSION AND RECOMMENDATIONS

A. Summary for Normal Group..... 116

B. Summary for EMR Group..... 119

C. Recommendations for Normal..... 123

D. Recommendations for EMRs..... 124

E. Variables Involved in Safe Driving..... 127

F. Summary of Variables Involved in Safe Driving... 128

CHAPTER PAGE

APPENDIX A--Visual Motor Gestalt Test..... 130

APPENDIX B--Driver Evaluator..... 131

APPENDIX C--Sixteen Personality Factor Questionnaire..... 133

APPENDIX D--The Wilson Driver Selection Test..... 134

APPENDIX E--Siebrecht Attitude Scale..... 135

APPENDIX F--Development of Situational Stress Test 136

APPENDIX F1-Pictures of Van..... 139

APPENDIX F2-Printed Record of Binary Check List..... 143

APPENDIX F3-Taped Instructions for Situational Stress Test..... 144

APPENDIX G--Description of Test on Pennsylvania Manual For Drivers..... 146

APPENDIX G1-Test on Pennsylvania Manual for Drivers..... 147

APPENDIX H--Combination of Stunts From Brace Iowa and Brace Test of Motor Ability..... 150

APPENDIX I--Questionnaire, Soliciting School Participation.... 152

APPENDIX I1-Letter of Introduction..... 153

APPENDIX J--Letter of Introduction Concerning Study..... 154

APPENDIX J1-Letter of Support for Study..... 155

APPENDIX J2-Description of Study..... 156

APPENDIX K--Questionnaire(Second), Soliciting School Participation..... 157

APPENDIX K1-Letter of Introduction Concerning Study..... 158

CHAPTER PAGE

APPENDIX L--Student Selection Form..... 160

APPENDIX L1-Student Selection Form..... 162

APPENDIX M--Biographical Data Sheet..... 163

APPENDIX N--List of Schools Represented in the Study..... 164

APPENDIX O--Correlation Matrices

APPENDIX O1-Correlation Matrix of Relationships Between Variables 20 Through 51 for the Total EMR Group and Variables 20 Through 51 for the Total Normal Group..... 169

APPENDIX O2-Correlation Matrix of Relationships Between Variables 20 Through 51 for the Female EMR Group and Variables 20 Through 51 for the Female Normal Group..... 170

APPENDIX O3-Correlation Matrix of Relationships Between Variables 20 Through 51 for the Male EMR Group and Variables 20 Through 51 for the Male Normal Group..... 171

APPENDIX O4-Correlation Matrix of Relationships Between Variables 70 Through 100 for the Total EMR Group and Variables 70 Through 100 for the Total Normal Group..... 172

APPENDIX O5-Correlation Matrix of Relationships Between Variables 70 Through 100 for the Female EMR Group and Variables 70 Through 100 for the Female Normal Group..... 173

CHAPTER PAGE

APPENDIX O6-Correlation Matrix of Relationships Between Variables 70 Through 100 for the Male EMR Group and Variables 70 Through 100 for the Male Normal Group..... 174

APPENDIX O7-Correlation Matrix of Relationship For Variables 20 Through 51 With Variables 68 Through 100 With Total EMR..... 175

APPENDIX O8-Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 With Total Normal..... 176

APPENDIX O9-Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 With Normal Female..... 177

APPENDIX O10-Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 With EMR Female..... 178

APPENDIX O11-Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 for EMR Male..... 179

APPENDIX O12-Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 for Normal Male..... 180

CHAPTER PAGE

APPENDIX P--Correlations of Predictor Variables with Criterion Variables..... 181

APPENDIX P1-Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group-Total EMRs..... 182

APPENDIX P2-Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group-EMR Males..... 184

APPENDIX P3-Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group-EMR Females..... 186

APPENDIX P4-Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group-Normal Total..... 188

APPENDIX P5-Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group-Normal Male..... 190

APPENDIX P6-Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group-Normal Females..... 192

APPENDIX P7-Accident Violation Variable, Group-Summary of Significant Correlations Between Independent Variables with Criterion Variables..... 194

CHAPTER PAGE

APPENDIX P8-Summary of Number of Correlation Coefficients of 80 Predictors with Seven Criteria, Statistically Significant at the .05 Level of Confidence by Group..... 196

APPENDIX Q1-Partial Correlations-Total EMR, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 197

APPENDIX Q2-Partial Correlations-EMR Males, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 198

APPENDIX Q3-Partial Correlations-EMR Females, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 199

APPENDIX Q4-Partial Correlations-Total Normal, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 200

APPENDIX Q5-Partial Correlations-Normal Males, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 201

APPENDIX Q6-Partial Correlations-Total Normal, State Reported Violation (Variable 154) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 202

APPENDIX Q7-Partial Correlations-EMR Females, State Reported Accidents or Violations (Variable 156) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 203

CHAPTER PAGE

APPENDIX Q8-Partial Correlations-Total EMR, Combined Accidents and Violations, Self and State (Variable #157) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 204

APPENDIX Q9-Partial Correlations-EMR Males, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 205

APPENDIX Q10-Partial Correlations-Female EMR, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 206

APPENDIX Q11-Partial Correlations-Total Normal, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 207

APPENDIX Q12-Partial Correlations-Normal Male, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 208

APPENDIX Q13-Partial Correlations-Normal Females, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in $r_{12.3}$)..... 209

REFERENCES..... 210

LIST OF TABLES

TABLE		PAGE
1.	Secondary Schools, By Region, Which Indicated Willingness to Participate in Study.....	28
2.	Distribution of Public Secondary Schools in Pennsylvania Having Programs for EMRs, By Region, Grades 10-12, 1969-1970 School Year.....	29
3.	Sample Base-"Normal" students' Enrollment, By Region, Pennsylvania Public Secondary School Students, Grades 10-12, 1969-1970 School Year.....	30
4.	School Districts in Pennsylvania, 1969-1970.....	31
5.	Sample Base-"Normal" Students' Distribution of Public Secondary School Students in Pennsylvania Grades 10-12, 1969-1970, By School Enrollment Category.....	32
6.	Actual Sample-By Group and By Region.....	33
7.	Distribution By Region For the EMR Sample.....	37
8.	Distribution By Region For the Normal Sample.....	38
9.	Means (Percents) and Standard Deviations (S.D.) For 153 Variables for EMRs and Normals By Sex.....	55
10.	Accident Violation Variable Group-Summary of Significant Correlations Between Independent Variables With Criterion Variables.....	69
11.	Summary of Number of Predictor/Criterion Correlation Coefficients Statistically Significant at the .05 Level of Confidence.....	71

TABLE PAGE

12. Multiple Correlation Coefficients (R) By Group and Selected Criterion Variables..... 72

13. Significance of Difference in Multiple Correlation Coefficients..... 73

14. Zero Order Correlation Coefficients Used in Calculating Multiple Correlation Coefficients and Partial Correlation Coefficients..... 74

15. Beta Weights for Predictor Variables for Each Group and Criterion Variables..... 78

16. Summary of Results of Partial Correlation Analysis..... 82

17. Correlation Matrices of Relationships for Criterion Variables..... 87

18. Differences Among Correlation Coefficients..... 88

19. Analysis of a Random Sample of Bender-Gestalt Results..... 114

20. Analysis of Specific Bender-Gestalt Errors..... 115

LIST OF FIGURES

FIGURES PAGE

I. Research Design..... 5

II. Eight Geographical Regions Within Pennsylvania Established by 1965 Governor's Advisory Committee For Comprehensive Mental Retardation Planning..... 6

III. Geographic-Demographic Distribution of Population EMR and Normal, Grades 10-12..... 36

SUMMARY

The purpose of this study was to measure and compare the variables related to driving safely and to designate factors which would be used to predict the success of educable mentally retarded students, in contrast to students with normal intelligence when operating motor vehicles.

A quota sample was used in conducting the study to select approximately seven-hundred and ninety-two high school students throughout Pennsylvania.

Three-hundred and forty-nine educable mentally retarded and four-hundred and forty-three intellectually normal students were tested and included in the sample. The students were in the sixteen to twenty chronological age range. The test results were analyzed based on the objectives of the study which included the following factors: visual acuity, visual organization, field of vision, depth perception, eye-hand coordination, class in school, residence, father's occupation, reaction time, emotional maturity.

The driving records of all students were checked at the Bureau of Traffic Safety in Harrisburg and their records compared to their performance on the tests administered by the research team. The results of the student's performance on the tests and their accident and violation records were then analyzed by computer.

A brief summary of the findings relative to the variables considered in this study follows.

Age. Accidents appeared to be distributed in equal proportion at all age levels, for the EMR group. Age for this group was not related with any of the accident violation variables. Age for the normal students was related to having accidents and violations. The older the normal students were, the more accidents and violations were reported.

Height and Weight. The height of the EMR students did not make any difference in the number of accidents or violations reported. The EMRs weighed an average of seven pounds more than the Normals. For the Female group, the heavier the girls were the more accidents they reported. The height and weight of the Normal students were related to self and state reporting of violations. The taller and

heavier Normal subjects were, the more likely they were to report accidents and violations.

Wearing of Glasses and Handedness. More of the Normal (10%) students wore glasses than the EMRs. The wearing of glasses for the female EMRs was related to not having accidents or violations. The wearing of glasses was not related to any of the criterion variables for the normal students. Handedness of the student was not related to the criterion variables for either the Normal or EMR students.

Class in School. Class in school was related to the criterion variables for the Normal and EMR students. The higher the class in school, the more likely the involvement in accidents and violations for both the normals and EMR students.

Residence. There was a relationship between residence and accident and violation involvement for the EMR and Normal students. EMRs who lived in cities or suburbs had more accidents than those who lived in towns or the country. The majority of EMRs in this study came from rural areas while the Normals were primarily from the cities and suburbs. Male Normals who lived in the cities had less accidents than those living in all other areas.

Father's Occupation. Father's occupation, as a measure of socio-economic status, was related to the accident criterion variables for the female EMRs and Normals. EMR Females who came from homes where the father had a more skilled occupation, had more accidents than those who came from homes where the father was unskilled. Normal girls who came from homes where the father was skilled, reported significantly more violations.

DRIVER EVALUATOR-TESTS SCORES

Visual Acuity. Acuity scores were negatively related to the criterion variables for the EMRs and Normal students. The higher the acuity scores, the more likely the students were to be involved in accidents and violations. Female EMRs had poorer vision scores in the acuity tests than any other group of students in this study.

Distance Judgement. Distance judgement scores were related to the criterion variables for the EMR students. The more accurate these students were in perceiving situations that were close to them, the less likely the chances of being involved in accidents or violations. There was no significant relationship on distance judgement scores with the criterion variables for the Normal students.

Color Vision. There were no significant relationships of color vision scores with the accident violation criterion variables for the EMR and Normal students.

Field of Vision. Field of Vision scores were related to the criterion variables for the EMRs and Normal students. High Field of Vision scores were related to involvement in accidents and violations. On this test, the female EMRs had lower scores than any other group.

Wilson Test of Driver Selection. The Normals had significantly more correct, more complete and a greater percentage correct on the Wilson tests, indicating that the test revealed a difference due to the nature of the tasks, motor skill development, coordination of fine muscles, perceptual speed and the ability to judge spacial relationships. However, there were some surprising findings in this correlation matrix. All correlations for the Normal students were in the expected direction. High scores on the Wilson Tests, for the Normal students were in the expected direction. High scores on the Wilson Tests for the Normal students, were associated with not having accident or violations. In contrast, a number of the Wilson Test scores were correlated in a direction that normally would not be expected for the EMRs. These tests included Visual Attention, Depth Visualization, Recognition of Complex Detail, the total number of tests passed and the Percent correct variables. Only Test 3 (Recognition of Simple Detail) and Test 5 (Eye-Hand Coordination) correlated in the expected direction with state-reported accidents. This indicates that EMRs who had good recognition of detail and good eye-hand coordination were less likely to have accidents.

The Sixteen Personality Factor Questionnaire. The factors on the Sixteen Personality Factor Questionnaire were not significantly related to any of the accident violation criterion variables for either the EMRs or Normals. This test only revealed differences in personalities between EMRs and Normal students in this study.

Pennsylvania Manual Test and Siebrecht Attitude Scale. There were no significant relationships with the exception of the Female EMR group, between either of these test scores and the criterion variables for the EMR and Normal groups. The Normal students did score significantly higher than the EMR students on both of these tests.

Driver Education. A smaller percentage of EMRs than Normals had Driver Education in this study. There were significant relationships between Driver Education and the criterion variables

for the EMRs. This indicates that those EMR students who had Driver Education were less likely to have accidents or violations. There was no relationship between Driver Education and the criterion variables, for the male Normal. However, there was a significant relationship for the female Normals. Surprisingly, female Normals with Driver Education were more likely to report accidents and violations.

Miles Driven Per Year and Driving Experience in Months. The EMRs in this study had been driving approximately one year longer than the normals. There were no significant relationships between miles driven a year and the criterion variables for the EMRs. Miles driven a year and driving experience in months was significantly related to the criterion variables for the normal students.

Total Error Count for Braking, Steering, Signals and Speed. There were no significant differences in the mean scores for the EMRs and Normals, on the checks on the driving simulator, speed, steering, signals and braking.

Reaction Time-Braking and Steering. The EMRs reacted slower than the Normals to the majority of emergency situations involving braking and steering. The Normal Females had faster reaction times than any other group. The EMR Females had slower reaction times than any other group.

CHAPTER I

A. INTRODUCTION

This is the final report of the project 48-2062, (Grant No. OEG-)-9 482062-1326-(032), which has been conducted under a two year grant from the United State Office of Education, Bureau of Education for the Handicapped. This grant was awarded to the Special Education Department, after extensive collaboration between the Chairman of the Special Education Department and the Director of Safety Education at Millersville State College, Millersville, Pennsylvania. It began officially on January 1, 1969, and terminated on December 31, 1970. Data for the study was obtained from subjects within the geographic boundaries of the state of Pennsylvania.

Prior to the grant period, three related studies were completed at Millersville under the direction of the Department of Special Education and Safety Education Program.

Teacher Attitudes Toward Driver Education for Educable Mentally Retarded Adolescents, Robert E. Maier, 1967.

A Comparison of Accident Prevalence Between Educable Mentally Retarded and Intellectually Normal High School Students in Pennsylvania, Robert E. Maier, 1968.(A Masters Thesis)

An Analysis of Pennsylvania Driver Education Programs for the Educable Mentally Retarded, Barry H. Newill, 1968.(A Masters Thesis)

The results of these three studies served as a stimulus for further investigation in this area. As a result, the proposal for Project 48-2062, The Measurement and Comparison of Variables Related to Driver and Highway Safety Between Educable Mentally Retarded and Normal High School Age Pupils in Pennsylvania, was initiated.

In reviewing the literature that was available on the subject of Driver Education for Educable Mentally Retarded, it was discovered that much needed to be investigated in this area in terms of research.

Most Educable Mentally Retarded students will drive sometime in their lifetime, and the majority of them are highly dependent upon a motor vehicle as a means of transportation. As a result of the occupational goals that Educable Mentally Retarded students pursue, an automobile becomes the means for attaining their livelihood.(From this point on, E.M.R. will be used as an abbreviation for Educable Mentally Retarded students.)

B. THE NATURE OF THE PROBLEM

One of the growing social problems facing American society is the mass slaughter of men, women and children on its nation's highways. It is not only a tragic human loss, but a staggering economic loss.

Whenever American society is confronted with a problem that affects large numbers of its citizens, educators are usually called upon to assist in finding satisfactory solutions to the problems. Since the accident problem is one of such magnitude, society is again requesting the assistance of educators in searching for a solution.

Research has demonstrated that the major factor in the accident problem is human behavior, (Tillman and Hobbs, 1949; Klein, 1968; Carlson and Klein, 1970) Therefore, it is only logical to take steps that will improve human behavior. A method of doing this is to develop a means of measuring and determining physiological and psychological variables that will serve as predictors of a person's success as a driver.

The purpose of this study was to measure and compare the variables related to driving safety and to designate factors which can predict the success of Educable Mentally Retarded (EMR) students in contrast to students with normal intelligence when operating motor vehicles.

In conducting the study, a sample of 792 high school students (349 EMR's and 443 normal) with valid Pennsylvania operator licenses were tested. The subjects tested were selected from fifty-seven high schools at various geographic locations throughout Pennsylvania. The subjects tested were in the sixteen to twenty chronological age range.

All subjects tested completed a battery of tests directly related to the objectives of the study, and which included the following

specific factors: visual acuity, perceptual organization, field of vision, depth perception, eye-hand coordination, personality factors, reaction to stressful situations and attitudes toward driving, and knowledge of driving regulations.

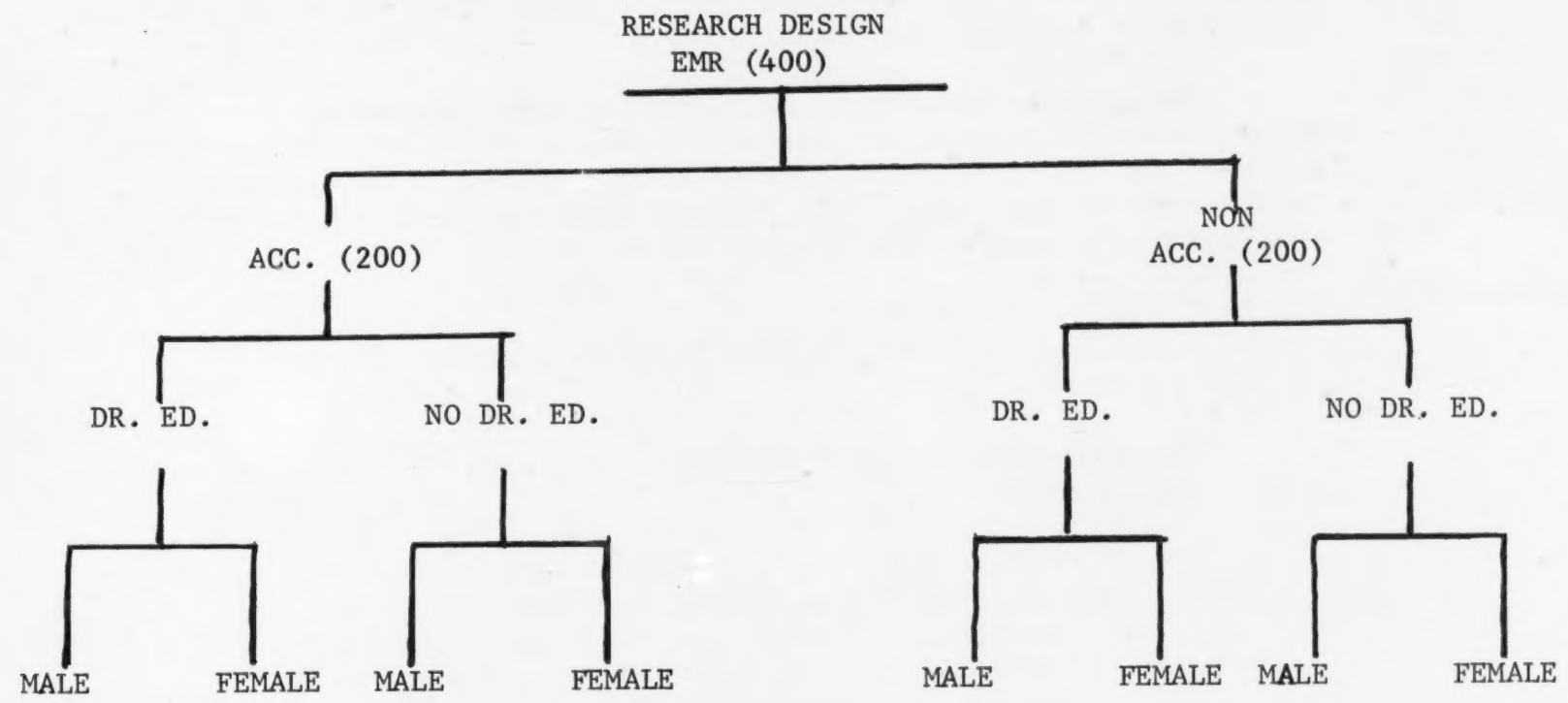
The driving records of all students were checked at the Pennsylvania Department of Revenue, Bureau of Motor Vehicles. The accident and violation records were then compared to the student performance on the tests. The results were then analyzed to show the difference between the groups.

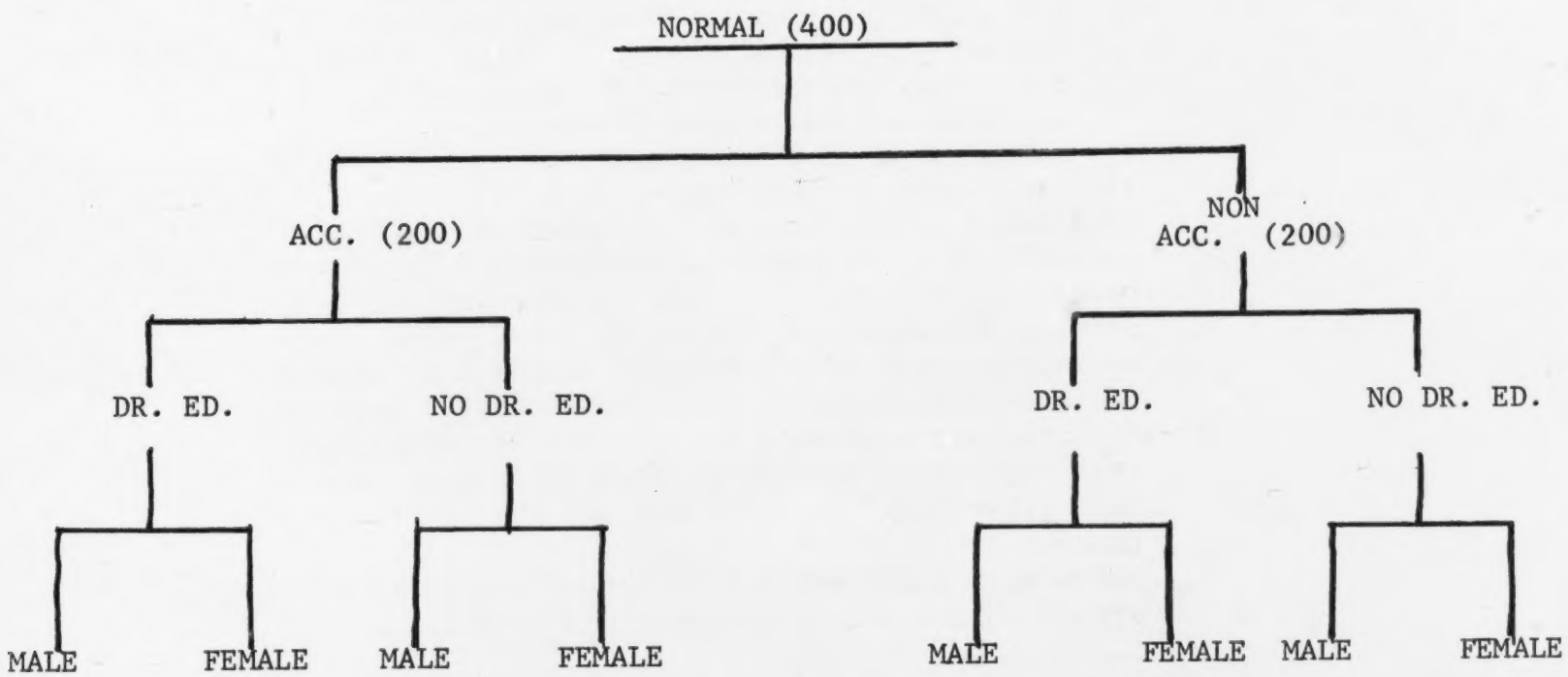
C. OBJECTIVES OF INVESTIGATION

The study was designed and undertaken with the following objectives in mind.

1. To measure those variables which are related to safe driving in the following comparison groups.
   a) Approximately four-hundred Educable Mentally Retarded students compared with approximately four-hundred intellectually normal students.
   b) EMR's and intellectually normal students who have been involved in accidents compared with EMR's and intellectually normal students who have not been involved in accidents.
   c) EMR's and intellectually normal students who have had Driver Education compared with EMR's and intellectually normal students who have not had Driver Education.
   d) Males compared with females.
   (Reference design, Figure I, p. 4)
2. To develop an instrument that measures situational stress. This instrument will measure a subject's perception and reaction time to immediate emergency driving situations presented on film. Also the appropriateness of a subject's response is recorded. (Reference Appendix F, Situational Stress Test)
3. To formulate a battery of specific variables that will indicate a subject's potential success as a safe driver for the EMR's and for the intellectually normal.
4. Serve as a guide and aid to Pennsylvania and other states in the future licensing of drivers.

FIGURE I





The ideal subject design with projected populations in each of the sixteen groups.

5. Serve as a guide to teacher training institutions in Pennsylvania and other states in the development of teacher training programs for the EMR's.
6. Assist Secondary Schools in the formulation of Driver Education Programs for the mentally retarded.
7. To contribute to the field of educational research, scientifically derived facts related to driver performance and success.
8. To provide for those interested in curriculum revision and improvement, both at the college and secondary level, valid information concerning the variables related to driving.
9. To assist those in Driver and Traffic Safety Education in their constant effort to reduce automobile accidents by providing for them detailed analyses on some of the pertinent variables related to driving.

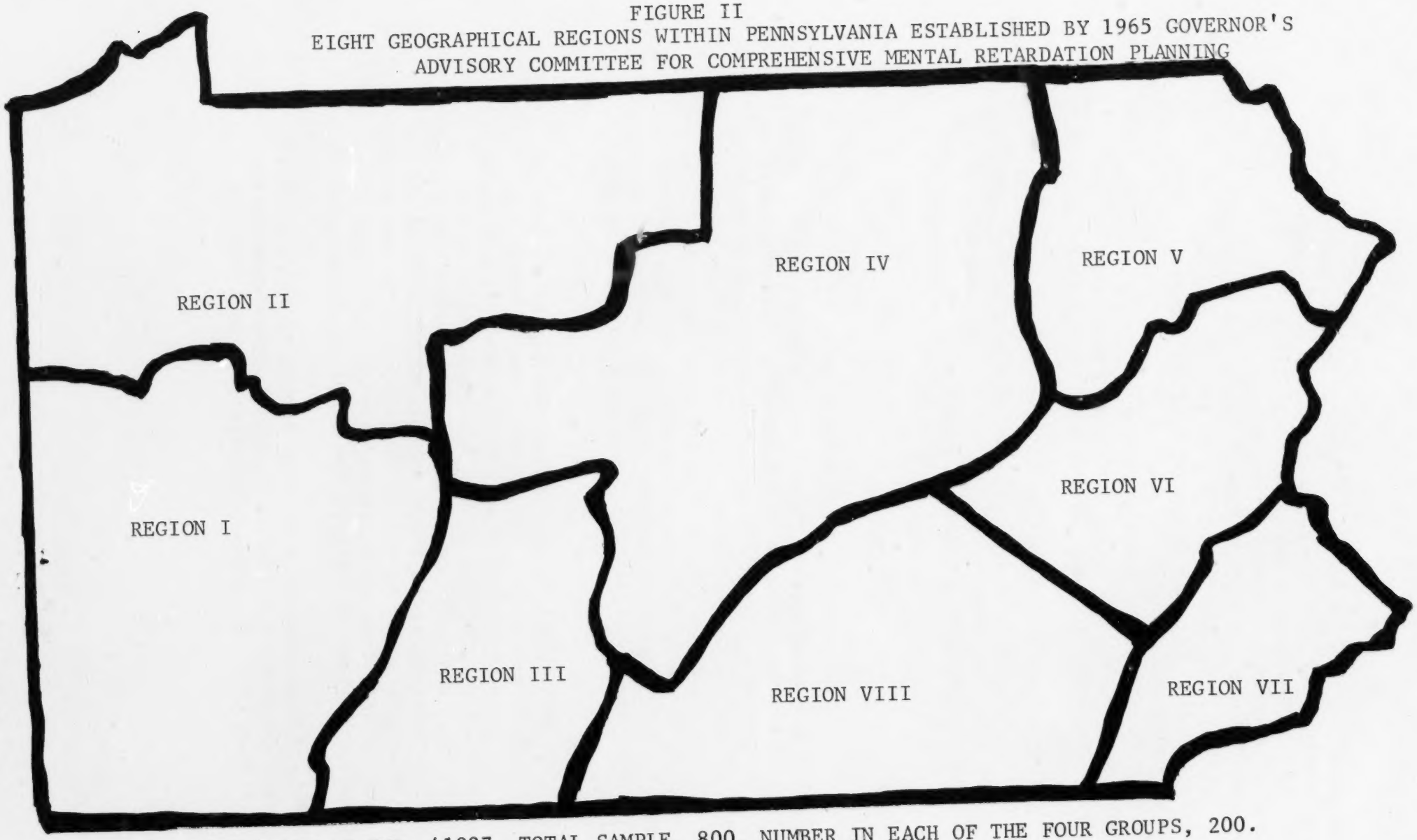
D. PROCEDURES

Sample. The method of selecting subjects consisted of a state-wide quota sample, based upon the ratio of Educable Mentally Retarded students in the total state population and the population of such students in each of the eight geographic regions established by the Pennsylvania Governor's Advisory Committee for Comprehensive Mental Retardation Planning in 1965.(Reference, Figure II, p. 6) Students who were within the intellectually normal range, as determined by class placement other than Special Education, were selected as the comparison group.

To accomplish this sampling procedure, the Bureau of Special Education, Department of Education, Harrisburg, Pennsylvania was consulted. From the bureau's records of approval and reimbursement forms for Secondary EMR's programs, a list was compiled of all schools in Pennsylvania that offered an approved Secondary EMR Program. Correspondence was undertaken with those schools which offered EMR Programs at the Secondary level to enlist their support in the study. Participating schools were then selected to provide the sample for the study.(Chapter 2 provides details of the sampling procedure.)

Design. The design consisted of four groups of intellectually normal and educable mentally retarded males and females ranging in chronological age from 16 to 20 years. The specific age range of

FIGURE II
EIGHT GEOGRAPHICAL REGIONS WITHIN PENNSYLVANIA ESTABLISHED BY 1965 GOVERNOR'S ADVISORY COMMITTEE FOR COMPREHENSIVE MENTAL RETARDATION PLANNING



TOTAL PA. POPULATION OF EMR, 41937, TOTAL SAMPLE, 800, NUMBER IN EACH OF THE FOUR GROUPS, 200.

REGION I
Total EMR-9935
% of Pa. pop.-23%
Sample pop.-184
Pop. in each 4 Gp.-46

REGION II
Total EMR-3246
% of Pa. pop.-64
Sample pop.-64
Pop. in each 4 Gp.-16

REGION III
Total EMR-2328
% of Pa. pop.-6%
Sample pop.-48
Pop. in each 4 Gp.-12

REGION IV
Total EMR-4010
% of Pa. pop.-9%
Sample pop.-72
Pop. in each 4 Gp.-18

REGION V
TOTAL EMR-1603
% of Pa. pop.-4%
Sample pop.-32
Pop. in each 4 Gp.-8

REGION VI
Total EMR-3022
% of Pa. pop.-7%
Sample pop.-56
Pop. in each 4 Gp.-14

REGION VII
Total EMR-12344
% of Pa. pop.-30%
Sample pop.-240
Pop. in each 4 Gp.-60

REGION VIII
Total EMR-5449
% of Pa. pop.-13%
Sample pop.-104
Pop. in each 4 Gp.-26

16 to 20 years was chosen because of the administrative feasibility in contacting both intellectually normal and Educable Mentally Retarded students in Pennsylvania Public Secondary Schools. All subjects tested in this age range were enrolled in public high schools.

The groups were arranged and selected according to the following classifications.

1. Educable mentally retardates without accident records.(N-238)
2. Educable mentally retardates with accident records.(N-111)
3. Intellectually normal without accident records.(N-252)
4. Intellectually normal with accident records. (N-191)

Additional analysis was made of the distribution within these groups to compare:

1. Males with females.
2. Students with Driver Education training compared with students without Driver Education training. (Reference Design, Figure I, p. 5)

E. ANALYSIS OF THE DATA

The analysis techniques used in this study are correlation techniques, including zero order correlations, multiple correlations, and partial correlations. The tests listed, starting on page 9, are used as "predictor" variables and accident/violation reports are used as criterion variables.

Correlation techniques have a number of advantages for this study:

1. With the large number of variables (more than 80 in all), and a number of different groups (EMR's vs. Normals; Males vs. Females) correlation techniques are the most efficient for studying the relationships or predictor variables with criterion variables.
2. Correlation techniques use all of the data.
3. The relationship of all data to accidents and violations can be studied within a single design.
4. The conceptual design focuses on prediction of accident and violation behavior as well as differences in prediction for EMR's vs. Normals.

Details of the research design and analysis techniques are presented in another chapter. In addition to the results of the correlational analysis, means standard deviations and other measures of central tendency and variability are reported.

F. DATA GATHERING INSTRUMENTS USED

Bender-Gestalt. The Bender-Gestalt Test consists of nine designs, each of which is presented to a subject for him to copy on a sheet of paper. This test was used in this study as a screening device for brain-injured subjects.(Reference Appendix A)

Driver Evaluator(American Automobile Association). The driver evaluator consists of four vision tests.

1. Visual Acuity. This consists of four Snellen Eye charts utilizing black letters on a flat white background. Distance is kept constant. Each chart has fourteen (14) letters accurately graduated in size to measure acuity from 20/100 to 20/13.
2. Distance Judgement. For this test, three miniature automobiles are placed in various positions relative to one another. The subject is asked to identify the car which appears farthest away and which appears nearest. The subject is required to make sixteen judgements from eight different patterns.
3. Field of Vision. This test consists of a semi-circular platform 20 inches in diameter hinged just below the eye-piece. In taking the test, the subject focuses on the center car at an apparent distance of 20 feet. Unseen by the subject, the examiner moves very slowly forward, a test target on either right or left side. To aid in giving consistent readings, the targets consist of 3/4 inch black and white segmented discs which rotate as they are moved forward. The subject indicates when the disc enters his field of vision, on a 180 degree radius.
4. Color Vision. Inside the cabinet is a small disc with eight sections of colored glass molded from the same glass as is used in traffic signals. This insures that the red, amber and green colors will be the same, as the subject must identify in a

traffic signal. The color disc is rotated so the subject can see only one color at a time through a small hole in the front of the cabinet.(Reference Appendix B)

Sixteen Personality Factor Questionnaire, Form "E". The Sixteen Personality Factor (16 P.F.) measures sixteen dimensions of personality as revealed by factor analysis, of 128 items, where the subject indicates preference for one statement over another.(Reference Appendix C)

Wilson Driver Selection Test. The Wilson Test consists of six sub-tests which are essentially non-verbal in nature. It is intended to measure ability to operate vehicles with minimal risk. The six sub-tests are visual attention, depth visualization, recognition of simple detail, recognition of complex detail, eye-hand coordination and steadiness.(Reference Appendix D)

Siebrecht Attitude Scale. The Siebrecht Attitude Scale is designed to measure attitude toward the safe operation of an automobile. This is done by measuring attitude toward the factors thought to be important in the safe driving of an automobile. In this test, the subject indicates his attitude toward forty statements related to driving by checking one of the five responses from "Strongly Agree" to "Strongly Disagree".(Reference Appendix E)

Situational Stress Test. The Situational Stress Test utilizes the Link Driving Simulator and Computer Console in conjunction with an eight minute filmed sequence from the Allstate Training film, "Hazardous Situations".

Due to the size of the Driving Simulator and Computer Console, a method of transporting it to the various testing locations had to be considered. A Ford Minihome Van was selected as a means of transportation for the Driving Simulator and consequently purchased for this purpose. The Minihome Van was then modified by the investigators to allow for a permanent installation of the Driving Simulator and Computer Console. This modified van type truck was then utilized for the following purpose:

1. A testing laboratory for the administration of the Situational Stress Test.
2. A means of transportation for the investigators to the various testing locations.
3. A method of transporting the Driver Evaluator and other testing equipment.

In a testing situation, the truck was parked outside the school in an area adjacent to the room used for group testing. The subjects reported individually to the van for the test, which requires approximately fifteen minutes.

For the Situational Stress Test, the subject operates the simulator and responds to emergency driving situations presented on film. The film was made to give the driver the same view of the road and traffic conditions as he would see if actually driving a car on suburban streets. The appropriateness of his response (braking, steering, signals and speed) to a given situation is checked by the computer via a binary code on the film. A recorder then prints a permanent record of the subject's action in proper form. In addition to this printed record, the system also provides a total count of braking, steering, use of signals and speed errors, accumulated by the subject during the driving sequence. The Link System was modified to include the measurement of complex reaction time in multi-seconds. This was accomplished by incorporating transistorized digital counters into the computer console.(Reference Appendix F for detailed discussion of Situational Stress Test and pictures of the van.)

Test on Pennsylvania Manual for Drivers. This test consists of twenty-five multiple choice type questions taken from information in the Pennsylvania Manual for Drivers. The items on the test are the same type questions asked students at the time of their driver's examination. The test was constructed at Millersville for the purpose of measuring a subject's knowledge of Pennsylvania Driving Regulations.(Reference Appendix G for Test on Pennsylvania Manual for Drivers.)

Brace Test. The original proposal for this study called for a test that would give some measure of General Motor Educability. The test selected for this study was the Brace Test of General Motor Achievement. Extensive experimentation with the Brace Test and stunts in the Iowa Test of Motor Educability was undertaken by the investigators with the assistance of college freshmen. Due to the extensive time factor (45 minutes) involved and physical facilities required to administer the stunts in the test, it was decided to select ten stunts (stunts #1, 2, 7, 8, 11, 15, and 18 from the Brace Tests and stunts #24, 27, and 34 from the Iowa Test) and start pilot testing. In terms of efficiency in administering the tests, student cooperation in taking the test and the over-all results of the tests, these stunts appeared to be the ones most suitable.

After giving the ten stunts selected to students in various high schools, many problems were encountered. Due to the nature of the stunts and the style of female clothes, girls were reluctant to perform them in street attire. After further experimentation, it was realized that the only safe way to administer the test would be in a high school gymnasium on a padded area. The girls taking the test wished to be dressed in gym clothes, which presented another problem. Since it was difficult to find a room at most high schools to administer the written test, the investigators were reluctant to ask school principals for the use of a gym. After questioning school administrators and physical education instructors, it was learned that most gymnasiums are in use during the entire school day. It was then decided to write to the U. S. Bureau of Research, explain the problems encountered in administering the Brace Test, and act on their recommendations. This action resulted in the deletion of the Brace Test of General Motor Achievement from the test battery.(Reference Appendix H for detailed explanation of each stunt from the Brace-Iowa Test used in pilot testing.)

G. FUNDAMENTAL ASSUMPTIONS

OF THE INVESTIGATORS

Due to the magnitude of this study, the travel involved to various testing locations, and the physical facilities available for testing, certain basic assumptions concerning the administration of the test had to be made.

The following assumptions were made by the investigators.

1. The tests were administered fairly and equally to all subjects, and all subjects were given sufficient time to complete the test battery without undue time pressure.
2. All subjects tested had at least a third grade reading skill.
3. The questions on the Pennsylvania Manual for Driver's Test were a representative sample of questions asked by driver examiners at Driver Examination Centers throughout Pennsylvania.
4. All scoring of testing instruments and key-punching of data cards was done in an accurate fashion.

H. LIMITATIONS TO THE STUDY

Siebrecht Attitude Scale. Various people who reviewed the test battery believed that the reading level on the Siebrecht Scale may be beyond that which is comprehended by the retarded population. After administering the test to all EMR's in the sample, it was found that the majority of the subjects appeared to respond favorably to the test. On a few occasions, the test had to be read to the subjects. The most frequent omission on this test was a question on the back of the test booklet asking the subject to rate himself as a driver. The question is in the form of a scale where one rates himself on a continuum going from very poor to expert driver.

16 Personality Factor Questionnaire. There are various forms of the 16 P.F. available for use. Experimentation was done with Form "A", "B", "C" and "E". Due to the reading level required in Forms "A", "B" and "C", it was decided to use Form "E", (For Adults of Limited Literacy). The only problem encountered was that this should not affect the results of the study unfavorably. Since only raw score descriptions were used, the importance of the standardization base is minimized. How this will effect the result is not known, since the normal sample took a test which was not standardized for students of normal literacy.

School Plant. The nature of this study required the investigators to travel throughout Pennsylvania, testing students at various geographic locations. Therefore, the physical conditions within the schools visited varied from school to school. Every possible effort was made to keep the testing procedure standardized at all times, however, it was difficult to have any control over the type of classroom that a participating school was willing to set aside for an entire day for testing purposes.

Job Training for EMR's. At many of the schools visited, the EMR's participated in job training programs. An attempt was made to release them from work for the day so they could be tested. On occasion, depending upon the length of the school day, adjustments had to be made in the testing program to allow the student to report for work in the afternoon. In such cases, the working student had to complete the entire battery of tests during the morning.

EMR's. When the original questionnaires were sent in March, 1969, asking schools for the number of EMR's that drive, the numbers indicated

some misleading information. In the summer of 1969, when the schools were contacted by telephone to arrange for testing, a sharp reduction in the number of EMR's was found over what had been reported in earlier correspondence.

In September, 1969, when final arrangements were made for testing, an even greater discrepancy in EMR enrollment was encountered. This can be attributed to the following factors:

1. June graduation
2. Dropping out of school to work
3. Pregnancy
4. Re-classification of students within a district; such as placement in other classes.

Accident vs. Non-Accident Groups. After reviewing the accident records, it was learned that some of the subjects tested were involved in accidents while operators of motorcycles, but not as operators of automobiles. Also, there is a time factor involved between the time a subject is arrested for a moving traffic violation and the time it appears as a charge against him on his official driving record in the Bureau of Traffic Safety in Harrisburg. This time factor varies from a month to a year, depending upon court proceedings and official conviction dates. Therefore, more of the subjects tested in this study may have been involved in accidents or arrested for moving traffic violations, but were not placed in accident cells for analysis purposes because at the time the investigators checked their driving record in Harrisburg, there were no convictions reported.

CHAPTER II

REVIEW OF THE LITERATURE

A. THE ACCIDENT PROBLEM

One of the most pressing social problems confronting contemporary Americans is the mass slaughter of its citizens on the nation's highways. The magnitude of this senseless carnage is seldom fully realized by the average American citizen.(Accident Facts, 1970)

By observation, it seems apparent that the vast majority of the motoring public has an attitude of indifference toward automobile accidents. A rapidly changing society who is busy doing more things within an affluent framework has created enormous pressures and problems for itself. It seems logical to deduce that this contributes to a general apathy toward automobile accidents and a general misuse of safety precautions by the motoring public.

There appears to be a popular feeling among safety educators that the news media contributes to this apathy by giving limited coverage to why automobile accidents occur and the causative factors in highway fatalities. International conflicts, politics, student riots and similar topics of high interest level appear to receive prime space and coverage. The public appears to have a high interest in the dramatic and spectacular events of the world and little interest in individual automobile accidents.

This lack of interest and apathy by the public toward automobile accidents appears to be due to the nature of accidents. Accidents are unpleasant topics and many people are not interested in reading or discussing details pertaining to them. Also, since individual automobile accidents effect only small segments of a population, society as a whole does not become alarmed. If the accident problem is viewed collectively, then the magnitude of the problem and the complacency of the public becomes apparent.

According to statistics compiled by the Insurance Information Institute during 1970, the economic cost of automobile accidents during 1969, in the United States was Sixteen Billion, Five-Hundred Eighty Two Million ($16,582,000,000), (News, February 16, 1970). This loss to the nation was the result of 22,025,000 accidents which killed 56,400 persons and injured 5,010,000. This tragic toll of death and injury on the streets and highways represents an economic loss averaging Three-Hundred Twenty Eight ($328.00), for every family in the United States (News, February 16, 1970). Statistics compiled by the Traveler's Insurance Company during 1970, reveal that in 1969-

1. Speeding was the chief cause of accidents.
2. Drivers under 25 years of age were involved in more than their share of accidents.

3. Three out of four people killed or injured were on dry roads in clear weather.
4. Weekends and midnight accidents broke all records of previous years.

The Traveler's Insurance Company report further breaks down the statistics into types of accidents in deaths.

TYPES OF ACCIDENTS

1969	Persons killed	Per Cent	Persons injured	Per Cent
COLLISION WITH:				
Motor Vehicle	22,500	39.8	3,440,000	73.2
Pedestrian	9,700	17.2	268,000	5.7
Fixed Object	6,500	11.5	277,000	5.9
Railroad train	1,200	2.1	5,000	.1
Bicycle	800	1.4	71,000	1.5
Other Vehicle				
Miscellaneous	500	.9	33,000	.7
Non-Collision	15,300	27.1	606,000	12.9
TOTAL	56,500	100.0	4,700,000	100.0

(The Travelers, 1970 Book of Street, Highway and Interstate Accident Facts, p. 2)

With these facts in mind, the necessity for engaging in the present study at Millersville becomes apparent. There is a real need to explore this problem since the National Safety Council reports that accidents are the leading cause of deaths to teenagers.(Accident Facts, 1970) The Traveler's Insurance Company claims that teenagers are involved in a disproportionate number of fatal accidents.(The Travelers, 1970 Book of Street, Highway and Interstate Accident Facts) This easily explains the sudden surge for expansion and improvement of Driver Education programs between 1950 and 1970. Educators have realized that the average teenager is going to drive one way or another. Therefore, it is better to have him learn to drive in a safe manner and teach him how to avoid accidents.

In a speech "People Tend to Drive as They Live", given by Senator Abraham Ribicoff, it was emphasized that "attitudes toward others developed in the formative years, greatly influence a person's conduct behind the steering wheel".Ribicoff (1967) In the process of a child's development, he should be taught good habits, manners, respect and consideration of the rights and property of others. If

these ideals are learned and practiced by children, as they grow older, they should be related to safe driving habits.

When a driver habitually behaves in an unsafe fashion in the streets and highways, this is a reflection of his behavior in other situations. "Personality and associated behavior patterns do not change just because an individual sits behind a steering wheel. Other things being equal, good citizens are usually good drivers and conversely good drivers usually happen to be good citizens .

SUMMARY

B. ACCIDENT PROBLEM

The number of licensed drivers, registered vehicles and miles of highway are increasing each year. With these increases, the injury and death rates due to automobile accidents have been increasing proportionately.

In most accidents, factors are present which relate to the driver, the vehicle and road conditions. Often it is the interaction of these factors which causes the series of events which culminates in mishaps.

The focus of this study will be the driver and the variables related to driver proficiency.

C. DRIVER EDUCATION FOR EMR's

Many educators are surprised when they hear any reference made to teaching mentally retarded students Driver Education. The public becomes very apprehensive at the very thought of mentally retarded persons driving automobiles. Kenel,(1969, p. 1) feels, "that this fear is generated as a result of two basic assumptions:

1. If a student is labeled retarded in school, he is automatically handicapped as an operator of a motor vehicle.
2. The retarded are not and will not be driving automobiles."

Kenel feels that both of these assumptions are erroneous.

Many people are apprehensive about the capabilities of these students in relation to performing the driving tasks. The following questions often arise when talking with teachers, administrators, parents, policemen and the general lay segment of the public. Can EMR's be taught to drive? Aren't there enough accidents without giving retarded students licenses? Is it safe for them to be on the highway? Aren't they endangering the lives of innocent people? Can they pass Driver Education Courses and the State Examinations? Who is to be responsible for teaching them?

Despite the questions about the capabilities of EMR's and the arguments presented for and against their driving, one basic fact is present. Retarded students like normal students will drive. They have been driving for many years and will probably continue to do so. The only solution is to teach them to drive in the safest manner possible.

A review of the research concerning EMR students' driving, reveals that very little had been done until the decade of the 1960's. Robert Gutshall (1963), coordinator of the Physically Handicapped program in Lansing, Michigan, asked a most appropriate question on the subject, and arrived at an equally appropriate and acceptable answer. "Why teach mentally retarded youngsters to drive? Why teach anyone to drive?"

For the EMR, as for about every other American, the automobile is an integral part of everyday life. It is used for convenience, pleasure, transportation and as a measure of one's status by his peer group. More important, when the EMR student graduates or leaves school, he is almost certain to work at some non-skilled or semi-skilled job. While driving may not necessarily be an integral part of a job, travel to and from the work situation is a necessity. In this motorized age, anyone who can master the basic skills of driving and pass a state's driver's examination, will probably own or operate a motor vehicle.

In 1968, the Springfield Instructional Material's Center for Handicapped Children sponsored a workshop at Illinois State University. The Workshop theme was "Should the EMH (Educable Mentally Handicapped) Student Be Taught To Drive"? The Workshop was under the direction of Dr. Francis Kenel, Chairman of the University's Traffic and Safety Education Department.

Dr. Robert Gutshall, Director of Special Education for Muskegon County, Michigan and Kenard McPherson of the University staff, assisted Dr. Kenel in coordinating the workshop. A selected group of Secondary Teachers of the Educable Mentally Handicapped and Driver Education

teachers participated in the workshop.

Powell (1968), reporting on the results of the workshop reports that much has been said, but little done to actually help the mentally retarded student take his place behind the wheel confidently and safely. Participants in the workshop stated that in traditional Driver Education courses, the rate of failure for retarded students is generally high. This can be attributed, in part, to inadequate preparation by the teacher. Too often, the teacher does not meet the individual needs of EMR students in various learning situations. Often the EMR appears to need two or three times the amount of instruction required by a normal student of the same age.

The majority of students have a desire and are usually highly motivated to learn to drive. Therefore, it is the teacher's challenge to select the proper materials and methods that will motivate and insure learning safe driving procedures. Leaders at the Illinois workshop recommended, "that either a team approach could be used or a correlated learning experience provided for the students with a Special Education class prior to and concurrent with the Driver Education course".(Powell, 1968, p. 6)

The Illinois State Workshop generated so much interest among educators, that the Office of the Superintendent of Public Instruction for the State of Illinois decided to conduct thirteen follow-up workshops at the county level. George Mathias, Director of Safety Education, Office of the Superintendent of Public Instruction (OSPI), speaking at one of the follow-up workshops stated, "We must strive to eliminate some of the 'blind spots' which now exist for these youngsters. It is to their social and economic advantage and it is our moral and legal responsibility in Driver Education."(Powell, 1968, p. 6)

In a study by Kahn (1955, p. 19), in California, it was reported that, "The key to success in a program of Driver Education for the slow learner, is the development of a course of study which will help the student realize that each step he takes brings him closer to his goal of acquiring a driver's license".

In analyzing behind the wheel training, Kahn noted that the manual dexterity of the retarded students was not noticeably different from the normal students. Some of the retarded students he worked with were poor in maneuvering a car, but the number of the students was no greater proportionately than the average. Kahn also found that the reaction time of the retarded students was similar to that of the normal, but he advocated longer periods of practice in the vehicle for

the EMR's. Kahn felt that the following factors should be taken into consideration when thinking of Driver Education for the EMR's (1955, p. 17):

1. Most young people, including the slow learner are going to drive a car no matter what their ability is.
2. Because of this, the slow learning students as well as others are strongly motivated to pass the motor vehicle test and would respond to a course of this nature.
3. It is felt that other areas of learning, such as citizenship, could be effectively correlated with the course.

Gutshall, Harper and Burke (1968, p. 43), compared the driving records of EMR students with the driving records of students of normal intelligence and found:

> Intelligence and socioeconomic status did appear to be influencing factors in the total number of violation points accumulated over a five year period. However, inspection and analysis of driving records indicated that subjects from high socioeconomic groups received more speeding violations than the low groups, and that low intelligence subjects had more points for violations, other than speeding, than the average and above average intelligence groups. The low intelligence group differed significantly from an average group on the factors of combined accidents and violations. However, the low intelligence group did not differ significantly from the high intelligence group on these same factors.

In a study of the relationship of Scholastic Achievement to Traffic Citations, Corbally and Knoll (1969), found that the students in the lowest grade-point group were not the greatest offenders and that the students in the highest grade-point groups were greater offenders than was hypothesized. The data showed a difference in the type of violations among the various groups. However, the authors pointed out that the number of violations per student and the number of violation points per student probably were not of great consequence. The results of this study give support to the hypothesis that there is little relationship between scholastic achievement and traffic citations.

Pappanihorn and Bowman (1959), were successful in initiating a program in Driver Education for EMR's at Pineland State Hospital

in Maine. EMR's were taught behind the wheel instruction for a period of eighteen hours and classroom theory for a period of eighty hours. The results indicated that the EMR's are capable of being taught how to operate an automobile safely. For EMR's in a Residential school, the driving skill was much more important to the rehabilitation of the male than the female residents.

In a New York State Study, Williams and Little (1966) reported that speed control of an automobile by the retarded was poorer than that of normal students. It was also noted that, "in instances of necessary coordinated hand and foot manipulations, it seemed difficult for the Special Class pupils to synchronize these movements". Also, the EMR student had trouble with hand over hand steering procedures.

Williams and Little stated a necessity for close cooperation between the Special Class teacher and the Driver Education teacher in teaching the retarded students how to drive an automobile. The authors final conclusion was:

> Through the use of special teaching techniques and through the close cooperation of the two teachers, it is felt that it is possible for these pupils to learn to drive in a safe fashion. This would enable EMR's to become more independent in terms of mobility and job possibilities and advance one more step in becoming useful members of society. (1966, p. 31)

Gutshall in reporting on his experience with teaching EMR students in Michigan, states that:

> Our experience with the EMR student has been good. Of 359 students, only six have been involved in collisions. Exposure rate is difficult to ascertain, but we do know of some former students that drive trucks for a living.(1961, p. 7)

In a subsequent study, Gutshall (1963) reiterated his success in teaching the EMR students to drive. He reported that of the entire number of EMR students involved in his Driver Education Program, sixteen percent were unable to pass the driver's examination given by the state even after repeated attempts. Of this sixteen percent, he recommended that some never be permitted to drive an automobile. This group comprised six percent of the total retarded population taught and were students having a diagnosis of brain injury.

D. SUMMARY

DRIVER EDUCATION FOR

EDUCABLE MENTALLY RETARDED

It has been demonstrated that most educable mentally retarded students are capable of learning to drive with reasonable proficiency. This is especially true if adaptations have been made in their driving instruction. There is support from the literature which indicates that most EMR students are highly motivated toward driving and are going to drive regardless of the consequences. Whether the EMR student drives legally or illegally, safely or unsafely is going to depend upon the educational program provided for him.

E. VARIABLES INVOLVED IN SAFE DRIVING

There are a number of factors involved in safe driving which are determined largely by the characteristics of an individual. Malfetti (1960) classified these characteristics into several groups such as:

1. Physical characteristics, such as age and sex.
2. Physiological characteristics, such as perceptual abilities and response capacities.
3. Intellectual characteristics.
4. Personal characteristics.
5. Social characteristics.
6. Educational characteristics.

The characteristics of an individual are directly related to how well one learns the skills and abilities that are necessary to safely perform the driving task. Ross (1960) describes the skills and abilities involved in safe driving as:

1. Motor skills necessary for the mechanical operation of an automobile. These skills would enable a driver to manipulate the various controls of a car in a precise and safe manner.
2. Perceptual as selective visual skills, necessary to interpret traffic situations in global fashion and make correct defensive decisions.

3. The ability to make correct applications of laws, both physical and manmade regulations, such as using proper lanes, knowing the limitations of the vehicle and the roadway while traveling and possessing the ability to compensate for known limitations.
4. The ability to make accurate judgements, such as estimate speed and distances, evaluate conditions and situations, and predict behavior patterns of other drivers.
5. The ability to initiate properly timed and correct responses to various traffic situations.

Individuals may vary considerably in the degree to which they develop a specific skill or ability. But if an individual is made aware of his lack of skill in performing certain driving tasks as his lack of ability, or poor peripheral vision, then he can take steps to compensate for it.

But what should be remembered is that driving is not limited to the manipulative skills. Equally important is the attitude and personality of the driver. Many investigations into the attitudes and personality of various types of drivers have been conducted. A few of these will be discussed on the following pages.

Heimstra and Associates (1967) administered a Mood Adjective Check List to groups of drivers and then tested them in a simulated driving task. In the analysis of high and low mood-score groups for each factor, it was discovered that subjects scoring high on factors of aggression, anxiety, and fatigue performed poorer on various driving tasks than subjects with a low score on these factors.

Kole and Henderson (1966) developed A Cartoon Reaction Scale (with "funniness" response choices) to test the hypothesis that problem and non-problem drivers would respond differently. Out of an original pool of 150 cartoons, 34 cartoons had discriminatory ability. Their research supported previous research which stated that hostility, aggression and other personality traits may be used as predictors of problem drivers.

Beamish and Malfetti (1962) in comparing scores of violators with non-violators found that the violator groups rated lower on emotional stability, conformity, objectivity and mood, and higher on psychopathic deviation, impulsivity and ascendancy. Also, the violator groups rated their parents as less active politically. From their results, they arrived at the following conclusions:

> The accident groups do not give proper thought to the implications of their behavior for themselves and others; they tend to be in disagreement or conflict with others including those closest to them and perceive themselves as held down and imposed upon; they are rebellious and selfish; their hypersensitiveness, lack of self-confidence and feeling of personal unworthiness may lead them to over compensate with erratic and ill considered action resulting in traffic violations; their parents are relatively inactive in the community, indicating in the children a lessened sense of civic responsibility.(1962, p. 12)

Tillman (1949) studied groups of drivers involved in accidents and matched groups of accident free drivers. He found that the groups involved in accidents were more aggressive, intolerant of authority, tended to be non-conformists and were irresponsible. Subsequent research in this area by Conger (1959) and Benton (1961) supported the earlier findings of Tillman. Schuman reporting (1967) found similar results with the specific characteristics of impulsiveness and inexperience of young male drivers as being related to driving accidents.

Gallagher and Moore's work (1969) supports that of Schuman. They report that exposure to risk, such as high mileage driven and that frequency of unsafe driving practices, such as drag racing or excessive speed, were positively associated with accidents.

Stratemeyer (1964, p. 17) in describing accident research states, "In clinical studies, accident repeaters are described as inclined to be impulsive and unsteady emotionally, egocentric, boastful and aggressive. They tend to be poorly adjusted socially, disrespectful toward or even resentful of authority and often seek excitement or adventure for its own sake."

Many of the text books used in Driver Education courses focus much attention on the importance of reaction time, visual acuity, depth perception, peripheral vision, color recognition and muscular coordination. Many researchers in driver behavior have identified the psycho-physical or sensory variables as being associated with driver proficiency. Some of the variables associated with driver proficiency:

1. Manual dexterity(Kahn, 1965; Williams and Little, 1966)
2. Perception in movement(Egan, 1967)
3. Speed control(Egan, 1967; Dawson, 1967)
4. Anticipation of events(Gutshall, 1963)

Authors such as Goldstein (1963, p. 2) attach little significance to the psycho-physical variables as related to accident involvement. Goldstein states, "The psycho-physical variables such as visual acuity, depth perception, auditory acuity, reaction time, etc., appear to be slightly, if at all, related to accident involvement."

F. SUMMARY

VARIABLES INVOLVED IN SAFE DRIVING

In reviewing the literature on accidents and driver behavior, it is found that there are many variables that influence driver performance. There are many different points of view as to which variables are the most valuable as predictors of driver success. Every individual possesses some ability in each of the variables, but the extent of proficiency and/or deficiency for any individual varies considerably.

It has been demonstrated that most educable mentally retarded students are capable of learning to drive with reasonable proficiency. This is particularly true if adaptations have been made in their driving instruction. However, the variables related to driving performance for educable mentally retarded students need to be compared to their accident and violation rates, prior to curriculum revision in this area. Also, a comparison of the records and test scores of EMR drivers and normal drivers should be studied to determine which variables might serve as predictors of driver success in both groups of drivers. The design and sample of the study is intended to investigate these comparisons.

CHAPTER III

SAMPLING PROCEDURES AND TEST ADMINISTRATION

A. SOLICITING PARTICIPATION IN THE STUDY

A sample was designed for the study which would represent the statewide population of Educable Mentally Retarded (EMR) students in Pennsylvania who are in the 16-20 age range in school, and who are licensed drivers. Students who fall within the intellectually "normal" range, as determined by class placement other than Special Education, were selected from participating schools as a comparison group.

The population list was obtained from a list of schools which had applied for approval and reimbursement of secondary-level programs for EMR students, using records from the Pennsylvania Department of Education, Bureau of Special Education. There were 388 schools which had applied for reimbursement as of January 21, 1969, when the list was compiled. With the exception of Philadelphia Schools, (which were sampled separately) this list represented the complete listing of schools in Pennsylvania which offered approved programs for secondary EMR students during the 1968-1969 school year.

A letter of introduction was sent to 388 schools and 34 schools in Philadelphia to solicit participation in the study. Included with the letter was a self-addressed, stamped postcard, which the respondent was asked to complete and return to indicate interest in participating in the study.(Reference Appendix I) In addition to the correspondence with individual schools which offer programs for secondary EMR students, a letter of introduction, dated February 6, 1969, and a description of the project was sent to all county and district superintendents, district supervising principals and county directors of Special Education in Pennsylvania.(Reference Appendix J)

This letter did not require a response, but was intended to enlist the support of administrators of the various county and district administrative units in the state. Included in this mailing was a letter of support from Dr. William Ohrtman, Director, Bureau of Special Education, Pennsylvania Department of Education.

Of the 442 cards sent with the initial letter, 258 (61%) were returned, twelve of which indicated that the school was not interested in participating in the study. (It is assumed that the 184 cards which were not returned indicated either a lack of interest, or a breakdown in communication within the school when the letter was forwarded to the department or program chairman. No follow-up correspondence was undertaken with the schools which did not respond to the first mailing.)

When a card requesting further information was returned, a second letter and postcard was sent. Specific details were provided in the second mailing as to the requirements of time and student involvement. The schools were asked to provide an estimate of the number of EMR students who would be licensed drivers by the 1969-1970 school year on the return card.(Reference Appendix K)

Of the 246 letters sent(between March and May, 1969), 132 cards (54%) were returned. Ten of these 132 returns stated that the school was not interested in participating in the study. It was from the 122 favorable replies that the participating schools were selected.

B SAMPLING TECHNIQUE

The original proposal for this study stated that a stratified random sample technique would be employed. However, due to the fact that only about 30%(122 schools) of the 406 schools which offered programs for secondary level EMR's were able to participate in the study, a stratified quota sampling technique was employed. The quota sampling technique was used to assure statewide representativeness of the sample with regard to region and other relevant variables. The stratification was based upon the ratio of the statewide enrollment (K-12) of Educable Mentally Retarded students within each of the eight geographic regions of Pennsylvania established by the Governor's Advisory Committee for Comprehensive Mental Retardation Planning in 1965. The intellectually normal population was drawn in about equal numbers to the EMR sample from each region. Figure 2, page 6, presents the percentage of the total EMR population within each region, and shows the proposed total sample from each region.

Table 1, page 28 shows the distribution of the 122 schools by region which indicated willingness to participate in the study. It should be noted that the percentage of schools in each region who were willing to participate in the study ranged from about 17% to 51%. The quota sampling technique provides for sample selection to achieve

greater representativeness in the state.

Table 2, page 29, illustrates the distribution of participating and non-participating schools in each of the eight regions. The table reflects both the number of schools and enrollment of EMR students in grades 10-12. Table 3, page 30, illustrates the distribution of the normal population of secondary school students, grades 10-12, divided by participating and non-participating schools by region. Tables 4 and 5, pages 31 &32, further illustrate the distribution of the normal group with regard to school enrollment category and size (class) of the participating and non-participating school districts. (It should be noted that the school district comparison is not a representation of the number of high schools, since a "district" may have several high schools in its jurisdiction. An example being the School District of Philadelphia, a "First Class" district, population over 500,000, which has more than 20 high schools.)

An examination of Tables 1-5, reveals that participating schools are more often found in Regions I, IV, V and VIII (Table 1) and tend to be in larger districts i.e. (First Class or Second Class, reference Table 4) and have larger enrollments (Table 5) than non-participating schools.

Using the quota sampling method, 53 schools were selected from the 122 to provide the sample for each region, based upon the EMR enrollment of the schools. Schools were selected within a given region, so that their combined EMR population would approximate the desired sample for that region. As a matter of administrative feasibility, schools which could provide the largest sample of EMR subjects were selected from the regions which had a greater number of schools willing to participate than were needed for the sample from the region.

Subjects of the study actually represent 57 individual schools; the difference due to the fact that four additional schools provided only normal subjects and no EMR's.

Table 6, page 33, illustrates an analysis of the sample, by groups within each region.

TABLE I

SECONDARY SCHOOLS, BY REGION, WHICH INDICATED

WILLINGNESS TO PARTICIPATE IN STUDY

REGION	Number of Schools Having Secondary EMR Programs, 1969-70	Number of Schools Indicating Willingness to Participate in Study	Percent of Schools Having Programs Which Indicated Willingness to Participate
I	99	34	34.34%
II	56	13	23.21%
III	23	4	17.39%
IV	63	22	34.92%
V	20	6	30.00%
VI	31	7	22.58%
VII	67	12	17.91%
VIII	47	24	51.06%
TOTAL	406	122(30.05%)	30.05% of total 406

TABLE 2

DISTRIBUTION OF PUBLIC SECONDARY SCHOOLS IN PENNSYLVANIA HAVING PROGRAMS FOR EMR's, BY REGION, GRADES 10-12, 1969-1970 SCHOOL YEAR

REGION		Participating Schools N	Participating Schools %	Nonparticipating Schools N	Nonparticipating Schools %	All Schools N	All Schools %
I	# Schools	9	16.98	90	25.50	99	24.38
	EMR Enrollment	550	31.85	2,119	29.30	2,669	29.80
II	# Schools	8	15.09	48	13.60	56	13.79
	EMR Enrollment	113	6.54	672	9.29	785	8.76
III	# Schools	3	5.66	20	5.67	23	5.67
	EMR Enrollment	90	5.21	452	6.25	542	6.05
IV	# Schools	4	7.55	59	16.71	63	15.52
	EMR Enrollment	116	6.72	919	12.71	1,035	11.55
V	# Schools	4	7.55	16	4.53	20	4.93
	EMR Enrollment	45	2.61	182	2.52	227	2.53
VI	# Schools	5	9.43	26	7.37	31	7.63
	EMR Enrollment	138	7.99	548	7.58	686	7.66
VII	# Schools	11	20.76	56	15.86	67	16.50
	EMR Enrollment	390	22.58	1,632	22.57	2,022	22.57
VIII	# Schools	9	16.98	38	10.76	47	11.58
	EMR Enrollment	285	16.50	707	9.78	992	11.08
TOTAL	# Schools	53	100.00%	353	100.00%	406	100.00%
	EMR Enrollment	1,727	100.00%	7,231	100.00%	8,958	100.00%

TABLE 3

SAMPLE BASE - "NORMAL" STUDENTS

ENROLLMENT, BY REGION, OF PENNSYLVANIA PUBLIC SECONDARY SCHOOL STUDENTS, GRADES 10-12

1969-1970 SCHOOL YEAR

	Participating Schools		Nonparticipating Schools		All Schools	
REGION		%		%		%
I	11,212	25.01	134,516	28.72	145,728	28.39
II	1,233	2.75	39,223	8.37	40,456	7.88
III	3,408	7.60	19,200	4.10	22,608	4.41
IV	2,744	6.12	34,674	7.40	37,418	7.29
V	847	1.89	26,278	5.61	27,125	5.29
VI	4,423	9.86	39,162	8.36	43,585	8.49
VII	14,292	31.87	125,187	26.73	139,479	27.18
VIII	6,681	14.90	50,136	10.71	56,817	11.07
TOTAL	44,840	100.00%	468,376	100.00%	513,216	100.00%

TABLE 4

SCHOOL DISTRICTS IN PENNSYLVANIA, 1969-1970

CLASS OF DISTRICT	Participating Districts N	%	Nonparticipating Districts N	%	All Districts N	%
First Class (Population 500,000 or more)	1	1.70	1	.17	2	.30
Second Class (30,000 - 500,000)	13	22.03	44	7.21	57	8.52
Third Class (5,000 - 30,000)	36	61.02	387	63.44	423	63.23
Fourth Class (Population less than 5,000)	9	15.25	178	29.18	187	27.95
TOTAL	59	100.00%	610	100.00%	669	100.00%

TABLE 5

SAMPLE BASE: "NORMAL" STUDENTS

DISTRIBUTION OF PUBLIC SECONDARY SCHOOL STUDENTS IN PENNSYLVANIA

GRADES 10-12, 1969-70, BY SCHOOL ENROLLMENT CATEGORY

	Participating Schools		Nonparticipating Schools		All Schools	
ENROLLMENT CATEGORY	N	%	N	%	N	%
1 - 499	245	.55	17,273	3.69	17,518	3.41
500 - 999	5,711	12.74	124,497	26.58	130,208	25.37
1,000 - 1,499	11,584	25.83	127,164	27.15	138,748	27.04
1,500 - 1,999	13,275	29.60	85,828	18.32	99,103	19.31
2,000 - 2,499	8,496	18.95	48,794	10.42	57,290	11.16
2,500 - Over	5,529	12.33	64,820	13.84	70,349	13.71
TOTAL	44,840	100.00%	468,376	100.00%	513,216	100.00%

N = Total enrollment, grades 10-12, for each enrollment category (Does not include EMR enrollment)

TABLE 6

ACTUAL SAMPLE: BY GROUP AND BY REGION

REGION	EMR Sample	Normal Sample	Total Sample	EMR Cells								Normal Cells							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I	74	113	187	8	3	21	3	7	5	23	4	16	10	15	15	16	18	13	10
II	34	28	62	4	0	3	0	5	5	15	2	6	1	4	0	1	2	0	14
III	22	26	48	1	0	1	0	10	1	9	0	4	0	0	1	6	0	12	3
IV	33	37	70	2	0	4	0	7	2	15	3	5	0	4	0	8	1	13	6
V	13	20	33	1	0	0	0	9	2	1	0	4	2	1	0	8	4	1	0
VI	32	25	57	2	1	6	0	3	1	14	5	3	0	2	1	13	3	3	0
VII	91	138	229	6	2	21	1	20	4	34	3	8	33	13	11	24	19	9	21
VIII	50	56	106	7	0	14	0	13	3	12	1	3	11	13	5	7	5	8	4
TOTAL	349	443	792	31	6	70	4	74	23	123	18	49	57	52	33	83	52	59	58
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

C. SELECTION OF SUBJECTS

Subjects of the study were selected by personnel from the participating schools on the following basis.

> It was requested that all EMR's in the school, who were licensed drivers, participate in the study. In order to provide a sample of normal students, school personnel were requested to select an equal number of normal students from programs other than "Special Education", to represent a reasonable range of ability. The selection of normal students was not based on achievement or intelligence test data.

Originally, the normal students were to be matched with the EMR's on the basis of age, sex, Driver Education training, and accident involvement. But this method of matching normal students proved to be very difficult for the school staff and had to be replaced by a sample based on a random selection of normal students. A copy of the instructions to school personnel for selecting students is included in Appendix K-1, pp. 158-159.

The number of EMR's in a school who were licensed drivers, determined the size of the sample from that school. However, because the number of EMR drivers varied widely from school to school, it became necessary on several occasions to sample an unequal number of EMR and normal subjects at an individual school. It was felt that this practice did not prejudice the results of the study since the two sample populations, EMR and normal, were not compared on the basis of individual subjects (matched pairs), but as one group compared with another.

In order to determine the number of subjects to be sampled from each geographic region, an attempt was made to approximate within the sample, the percentage of the statewide population of EMR and normal students within a given region. For example, the EMR subjects residing in Region I represent 31.85% of the statewide population of EMR's in grades 10-12. Therefore, the sample was constructed so that approximately 31.85% of the total sample would be residents of Region I.(Figure 3, p.36, illustrates the distribution of EMR's and Normal students in grade 10-12 by geographic region.)

It was not possible in every region to sample the exact number of subjects which would achieve the desired percentage for that region. When a sample for a region was relatively small, a difference of one or two subjects would affect substantially the resultant percentage. (Reference Appendix N for a list of Pennsylvania High Schools represented in the study.)

D. SIZE AND DISTRIBUTION OF THE SAMPLE

A total of 819 subjects were tested in the study, of which complete test battery results were obtained on 792 individuals. Of that total, 349 subjects had been classified as Educable Mentally Retarded (EMR) by school personnel, and 443 as "intellectually normal". Tables 7 and 8, pages 37 & 38, illustrate the distribution among the eight regions of the EMR and normal sample, respectively. A comparison of the percentage of the total enrollment within each region (Column B), and the percentage of the total sample from each region (Column D), indicate the manner in which the sample follows the statewide population of EMR and Normal students in grades 10-12.

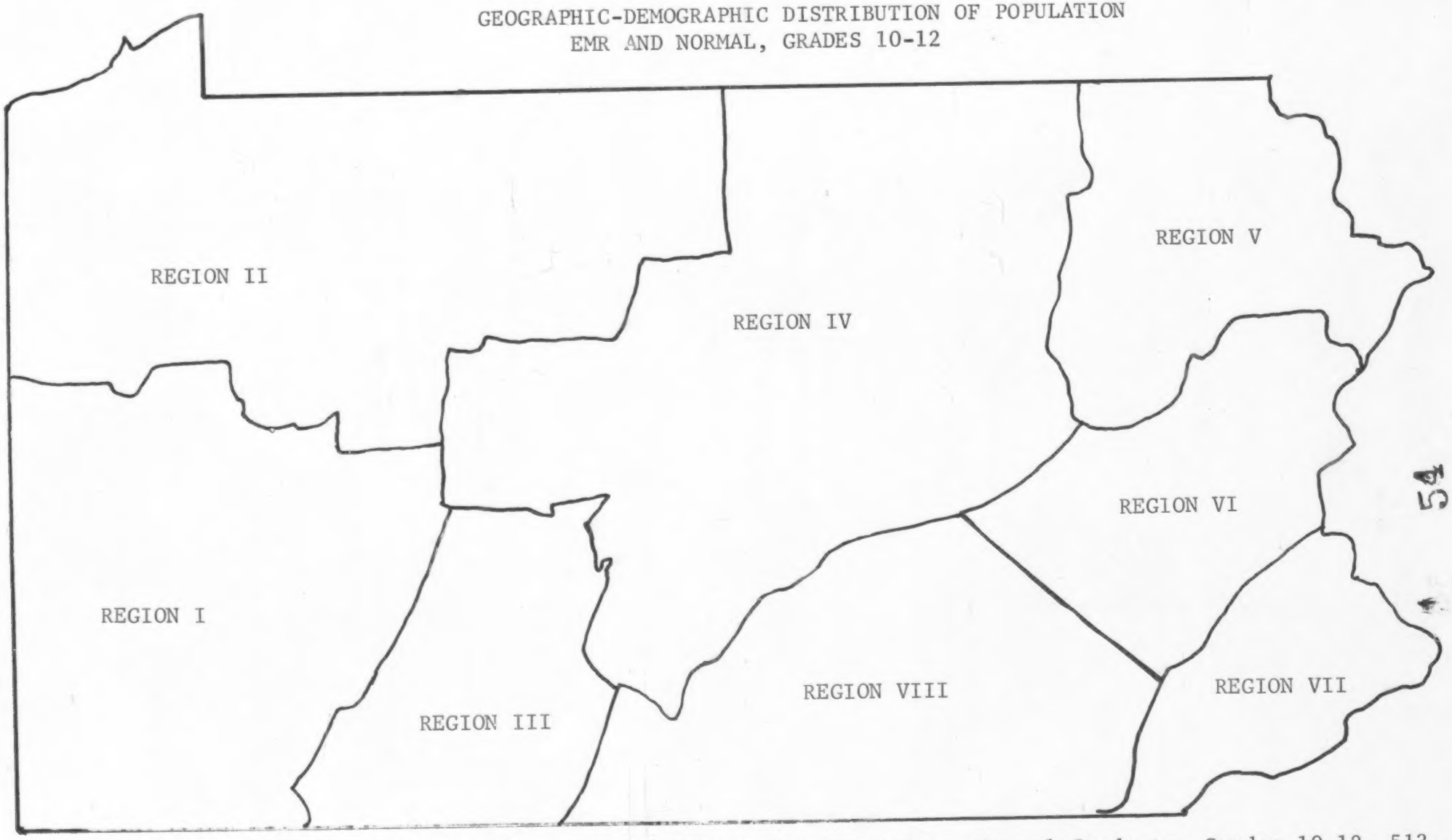
E. REPRESENTATIVENESS OF THE SAMPLE

The 349 EMR subjects of the study represent the entire population of EMR students in the participating schools who were licensed drivers at the time the tests were administered. In three schools, a total of 13 EMR licensed drivers were not tested because of scheduling difficulties. Dividing the number of EMR's known to be licensed drivers in the participating schools, by the total EMR enrollment of those schools, would indicate that approximately 21% of all EMR's in grades 10-12 are licensed drivers. This percentage, projected to the statewide enrollment of EMR's in grades 10-12(8,958) would indicate that there are approximately 1,880 EMR licensed drivers who are enrolled in senior high school level programs for EMR's in public secondary schools of Pennsylvania. The 349 EMR subjects of this study represent 18.56% of the approximated total of EMR drivers statewide, and 3.90% of the total enrollment of EMR's in public schools, grades 10-12.

Since the 443 normal subjects sampled at the participating schools do not represent the entire population of licensed drivers in those schools, it is not possible to calculate the approximate percentage of the statewide population of normal students in grades 10-12, who are

FIGURE 3

GEOGRAPHIC-DEMOGRAPHIC DISTRIBUTION OF POPULATION
EMR AND NORMAL, GRADES 10-12



Total Population of EMR's, Grades 10-12, 8,958; Total Population, Normal Students, Grades 10-12, 513, 216

REGION									TOTAL
# of EMR's	2,669	785	542	1,035	227	686	2,022	992	8,958
% of Total	29.80%	8.76%	6.05%	11.55%	2.53%	7.66%	22.57%	11.08%	100.00%
# of Normal	145,728	40,456	22,608	37,418	27,125	43,585	139,479	56,817	513,216
% of Total	28.39%	7.88%	4.41%	7.29%	5.29%	8.49%	27.18%	11.07%	100.00%

TABLE 7

DISTRIBUTION BY REGION FOR THE EMR SAMPLE

REGION	A Grade 10-12 Enrollment of EMR's	B % of Total Enrollment (8,958)	C Sample N	D % of Sample (349)
I	2,669	29.80	74	21.20
II	785	8.76	34	9.74
III	542	6.05	22	6.30
IV	1,035	11.55	33	9.46
V	227	2.53	13	3.73
VI	686	7.66	32	9.17
VII	2,022	22.57	91	26.07
VIII	992	11.08	50	14.33
TOTAL	8,958	100.00%	349	100.00%

TABLE 8

DISTRIBUTION BY REGION FOR THE NORMAL SAMPLE

REGION	A Enrollment Grades 10-12	B % of Total Enrollment (513,216)	C Sample N	D % of Sample (443)
I	145,728	28.39	113	25.51
II	40,456	7.88	28	6.32
III	22,608	4.41	26	5.87
IV	37,418	7.29	37	8.35
V	27,125	5.29	20	4.52
VI	43,585	8.49	25	5.64
VII	139,479	27.18	138	31.15
VIII	56,817	11.07	56	12.64
TOTAL	513,216	100.00%	443	100.00%

licensed drivers. Further, figures regarding the number of percentage of drivers in the "normal" category were not available through the Pennsylvania Department of Education.

> The 443 normal subjects of the study represent .086% of the total enrollment of 513,216 students in regular school programs, grades 10-12. This gives an indication of the representativeness of the normal sample.

F. TEST ADMINISTRATION

When a school had agreed to participate in the study by providing a portion of the sample, a date was established for the testing to take place. Students at the participating schools who were to be included in the study, were selected by school staff members as outlined above. (See "Selection of Subjects") In several cases, it became necessary for the investigators to make the selection of students. In these cases, the selection followed the guidelines already established, but was done by the investigators rather than the school staff.

It was requested that all EMR and normal students participating in the study meet with the investigators at the earliest possible time in the school day. The purpose of the meeting was to introduce the investigators to the students, and to provide students with an understanding of the objectives of the study and their reason for participating in it. In the introduction, a major emphasis was given to the fact that the student and his school would remain anonymous for the purpose of the analysis, but that he should make every effort to present himself, through the test battery, in the most accurate manner which he could. It was also stressed that the results of each individual's test would be confidential, and would, not be reported to any individual or agency. Opportunity was provided for students to present questions on any aspect of the study concerning their involvement.

Following the introduction, the total group, usually twelve to twenty-four students, was divided into two groups; EMR's comprising one group, and normal subjects the other. The EMR group remained at the testing location to complete the written segment of the test battery during the morning, while the normal subjects were scheduled at fifteen minute intervals throughout the morning to report individually to the testing van (Ford Minihome) which housed the driving simulator

used in the Situational Stress Test. In the afternoon session, normal subjects completed the written battery, while EMR subjects reported individually to the van.

This method of scheduling allowed time for any EMR who had not completed the written portion during the morning session to finish during the afternoon session. Also, it was decided that by separating the EMR's and normal subjects, group pressures on the individuals involved would be minimized. This procedure of testing EMR's and normals separately was found to be most successful since, for example, an EMR student of low ability would be less likely to experience concern over the speed and apparent ease with which a more capable student completed the battery of tests.

While the method of administering the test battery was identical for both EMR and normal subjects, it was frequently necessary to spend more time with the EMR group in explaining various sub-tests and portions of the test battery. Also, it was not possible in every instance to schedule students in the manner outlined above because of difficulties and irregularities at the various schools and scheduling problems with individual students.

The sequence and method of administering the tests is described in the following section to provide a more complete understanding of the means by which data was gathered for the study.

After pencils and the packet of testing materials were distributed, directions were given for completing the biographical information card, which included such items as driving experience, miles driven per year, accident involvement, and various other items of a personal nature. (A copy of the information sheet is included as Appendix M.) All students completed the card simultaneously since directions were provided item by item. Completion of the card required approximately fifteen minutes.

The Wilson Driver Selection Test was then administered to the subjects; requiring a total time of approximately fifty minutes. The actual working times for the six sub-tests of the Wilson Test are divided as follows:

Test 1 - Visual Attention-	5 Minutes
Test 2 - Depth Visualization-	5 Minutes
Test 3 - Recognition of Simple Detail-	4 Minutes
Test 4 - Recognition of Complex Detail-	5 Minutes
Test 5 - Eye-hand Coordination-	2 Minutes
Test 6 - Steadiness-	5 Minutes
Total	26 Minutes

Since the Wilson Test is timed, the starting and finishing time for each sub-test was controlled. Adequate time was provided between administration of the sub-tests, but the pace was rather continuous.

Upon completion of the Wilson Test, the Bender-Gestalt Test was administered to the entire group, utilizing an overhead projector and screen. A transparency showing the directions was first projected on the screen and read aloud by the investigator. Then, the nine designs of the test were projected on the screen, one at a time. This was accomplished by the technique of revelation, whereby "masks" covering each individual design were removed for the period of time that the students were reproducing that design. The mask was then replaced, and the next design revealed. Administration of the Bender-Gestalt Test required approximately ten minutes.

With the completion of the Bender designs, the students had completed approximately one hour and fifteen minutes of work with several short pauses. The work within this period of time was regulated by the investigator, with all students working on the same tasks at the same time. From this point until the completion of the entire battery, the work was untimed and students were permitted to complete the remainder of the battery at their own rate.

To avoid interruption and allow for the individuals' varying rates of completion, directions for the remaining three tests, (The Sixteen Personality Factor Test, The Siebrecht Attitude Scale, and the Test on the Pennsylvania Manual for Drivers) were provided before any of the tests were begun. All directions were read aloud by the investigator while the subject read them silently. Sample items were worked for each test, and any questions regarding the tests were answered by the investigator. Students were directed to work carefully at the rate best suited to them, and were permitted to leave the testing location for a short break when they felt it necessary.

When a student completed the 128 items on the Sixteen Personality Factor Test (16 P.F.), usually within 30-45 minutes, he began work on the Siebrecht Attitude Scale. The forty items on the Siebrecht Scale required about fifteen minutes to complete. Finally, the student completed the twenty-five multiple choice statements of the Test on the Pennsylvania Manual for Drivers. The test was usually completed within twenty minutes.

While the subjects were working on the 16 Personality Factor, Siebrecht, and the Pennsylvania Manual Test, the investigator called subjects individually for a visual examination on the AAA driver

Evaluator. This device was usually set-up in a position to the rear of where the subjects were seated, so that the administration of the visual examination would not distract subjects who were completing the written battery. Approximately five minutes was required for each subject to complete the tasks of the visual examination. Results of the AAA Evaluator were recorded directly on the student's data card.

As subjects completed the entire battery of tests, they were permitted to return to their classes. Because the latter portion of the test battery was untimed, the total time required for completion of the entire battery of tests varied with individual subjects. The time required for completion ranged from two and one-half hours to three hours and fifteen minutes, depending upon the rate at which the subject completed the untimed portion of the battery.

In addition to the test battery described above, the Situational Stress Test was administered on an individual basis to all subjects of the study. For this test, students reported to the testing van which was located outside of the school. (Reference to Appendix F, for a description of the Situational Stress Test.)

As a control for the variables related to the personality and other personal characteristics of the test administration, all written tests in the battery were administered by the same investigator, while the Situational Stress Test was administered entirely by the other investigator. While one investigator worked with subjects in the classroom, the other operated and administered the Situational Stress Test within the testing van.

CHAPTER IV

RESULTS

A. METHODS OF ANALYSIS

As the primary purposes of this study include the prediction of accidents and violations for EMR's and the comparison of relevant driving behaviors among EMR's and Normal students, the major methods of analysis for the study focus on correlation methods, including multiple correlation and partial correlation techniques. In addition, data are presented in this report on the zero order correlations and on means and standard deviations for male, female, and all EMR's and male, female and all normal subjects.

Multiple correlations techniques have the advantage of using all of the data within a single analysis design. In the present study, results are presented for 104 variables including seven criterion measures of accidents and violations, and 97 predictor variables. The relationship of all the measures to accidents and violations can be studied within this analytic framework by examining the zero order correlations. The multiple correlations technique yields the "best combination" of predictor variables related to criterion variables. (Reference: Guilford, 1950). Product moment correlations were used in the calculation of the basic correlations matrixes.

An additional advantage of the correlations technique is that the size of the subsamples (EMR's vs. Normals, Males vs. Females) need not be equal. In analysis of variance and covariance designs, the formulae do not generally apply when sample sizes for the various cells are widely disparate. In the original project design, it was proposed to obtain data for 16 groups of 50 subjects each, for a total of 800 subjects, namely: EMR's vs. Normals; Males vs. Females: those with Driver Education vs. those without Driver Education; and those who have had accidents vs. those who did not have accidents. However, as the study progressed, it became apparent that it would not be possible to obtain data for each group in equal numbers, due to the fact that many Female EMR's did not have drivers' licenses. Of those EMR's that did have drivers' licenses at the secondary level, the largest proportion turned out to be male. The need to obtain a sample with proportional statewide representation precluded further selectivity. In addition, the proportion of each of the EMR and normal groups who had Driver Education or who had an accident could not be controlled, a priori. Hence, by using correlations techniques, the data for all of the subjects was employed in the analysis, thus making for a more efficient and powerful analytic technique.

The partial correlation technique provides a method for studying the relationship of the predictor variables to accidents and violations while controlling for the effect of other variables. The partial correlations formula is given as:

$$r_{12.3} = \frac{r_{12} - r_{13} r_{23}}{\sqrt{1 - r_{13}^2}\sqrt{1 - r_{23}^2}}$$

Where:

Variable 1 is a predictor,
Variable 2 is the criterion variable and
Variable 3 is the variable being "partialled" or "controlled"

and

r_{12} is the correlation of the predictor variable with a criterion variable.
r_{13} is the correlation of the predictor variable with the variable to be partialled.
r_{23} is the correlation of the criterion variable with the variable to be partialled.

All data was obtained separately for each of six groups, namely:

1. Male EMR's
2. Female EMR's
3. Total EMR's
4. Male Normals
5. Female Normals
6. Total Normals

Initially, means and standard deviations and zero order correlation matrices were obtained for each of the six groups in order to determine whether or not there were any differences in the group means and whether or not there were differences in the patterns of correlation with accidents for EMR's and normals. It was reasoned that if the correlation patterns differed for EMR's and normals, that it would be desirable to carry out the multiple correlations and partial correlations separately for each group. There was already ample evidence in the literature to suggest differences among males and females and therefore, it was anticipated that this data would be calculated separately. As shown later in this Chapter, the differences in patterns of correlations and in means did in fact prove to be significant. Therefore, the multiple

correlation and partial correlation analyses were carried out separately for each of the six groups.

With the exception of the multiple correlation analysis, all data analyses were carried out at the Computing Center at Shippensburg State College, Shippensburg, Pennsylvania, using an RCA Spectra 70/45. The University of California Biomedical Series programs were used for the following analysis:

BMD OLD - Simple data description for the means and standard deviation.
BMD X84 - Assymetrical Correlations with Missing data for the zero order correlations.

Specially devised programs were prepared for the partial correlations and the multiple correlations.

B. DESCRIPTION AND CODING OF VARIABLES

Table 9, page 55, provides a description of a number of variables included in the analysis. However, certain variables that are inadequately described in that table require further amplification as follows:

ITEM DESCRIPTION AND CODING

Variable Number and Description		Comments and Coding
1-4	Student ID Code, EMR vs. Normal, driver's operator number and region	These variables were not included in the analysis.
5-10	Age, height, weight, glasses, and handedness	Self explanatory
11	Class in school	1-Freshman 2-Sophmmore 3-Junior 4-Senior X-No information
12	Percent not in Special Education	0-Special Education 1-College Preparatory, Commercial, General, Academic, other X-No information

Variable Number and Description		Comments and Coding
13	Percent in College Preparatory or Academic	0-Special Education, Commercial, General, or other 1-College Preparatory or Academic X-No information
14-18	Residence	The original coding for this item was as follows: 1-Farm 2-Rural 3-Town 4-Suburbs 5-City X-no information The items were recoded in order to be used in the correlational analysis and are presented in the table of means as percentages.
14	Percent Town, Suburbs or City	0-Farm or Rural 1-Town, Suburbs or City X-No information
15	Percent Suburbs or City	0-Farm, Rural or Town 1-Suburbs or City X-No information
16	Percent Farm, Rural, Town or City	0-Suburbs 1-Farm, Rural, Town or City X-No information
17	Percent Farm, Rural, Town or Suburbs	0-City 1-Farm, Rural, Town or Suburbs X-No information
18	Percent Farm, Rural, Suburbs or City	0-Town 1-Farm, Rural, Suburbs or City X-No information
19	Father's Occupation	1-Unskilled labor 2-Skilled craftsman 3-Sales, manager, foreman, etc. 4-Professional, technical, proprietory X-Insufficient information (Reported by the student)

Variable Number and Description		Comments and Coding
20-29	Driver Evaluator	
20	Visual Acuity - Left	0-14
21	Visual Acuity - Right	0-14
22	Visual Acuity - Both	0-14
23	Depth Judgement - Total	0-16
24	Depth Judgement - Near	0-8
25	Depth Judgement - Far	0-8
26	Color Vision	0-Normal 1-Difficulty with red, yellow or green
27	Field of Vision - Left	50-110
28	Field of Vision - Right	50-110
29	Field of Vision - Total	100-220
30-51	Wilson Driver Selection Tests	This test has six parts each of which is scored for the number complete, number correct, and percentage correct. The figures below show the range applicable to the number complete and the number correct. The Wilson Test Manual also provides for scoring the total battery according to the number of tests passed (0-6).
	Test 1-Visual Attention	0-40
	Test 2-Depth Visualization	0-50
	Test 3-Recognition of Simple Detail	0-150
	Test 4-Recognition of Complex Detail	0-150
	Test 5-Eye-Hand Coordination	0-145
	Test 6-Steadiness	0-50
52-67	Sixteen Personality Factor Scale	0-8 for each test
68	Pennsylvania Driver's Manual	% Correct
69	Siebrecht Attitude Scale	0-200
70-73	Driver Education	The original code was: 15-Both behind wheel and classroom 21-Did not have Driver Education 22-Behind the wheel training only 23-Classroom training only

Variable Number and Description		Comments and Coding
		This was recoded as follows:
70	Percent Not taking combination of Classroom plus Behind Wheel Instruction	0-Both behind wheel and classroom training 1-Did not have Driver Education, behind the wheel training only or classroom training only
71	Percent with Driver Education	0-Did not have Driver Education 1-Both behind the wheel and classroom, behind the wheel only, and classroom only.
72	Percent no Driver Education or Classroom only	0-Both behind the wheel and classroom training or behind the wheel instruction only 1-Did not have Driver Education or had classroom training only
73	Percent No Driver Education or Behind Wheel only	0-Both behind the wheel and classroom training or classroom training only 1-Did not have Driver Education or behind the wheel only
74	Miles Driven Per Year	1-Less than 2,000 2-2,000 to 4,000 3-4,000 to 6,000 4-6,000 to 8,000 5-8,000 to 10,000 6-over 10,000 X-No information
75-76	Driving Experience, Driving Restriction	Self explanatory
77-149	Stress Test	This test is a driving simulation device developed by Millersville State College described in more detail in Appendix F. Scoring is for errors and reaction time.
77	Braking Errors	0-16
78	Steering Errors	0-6

Variable Number and Description		Comments and Coding
79	Signal Errors	0-5
80	Speed Errors	0-3
81	Reaction Time - Brakes-5 Immediate Situations	0.0005-3.000
82	Reaction Time - Brakes-5 Apparent Situations	0.0005-3.000
83	Reaction Time - Brakes-Total 10 Situations	0.010-6.000
84	Reaction Time - Steering-Left-4 Situations	0.004-3.200
85	Reaction Time - Steering-Right-5 Situations	0.005-4.000
86	Reaction Time - Brakes and Steering, Total-19 situations	0.019-13.200
87	Seat belt usage	Self explanatory
88	Steering Handling-Percent Incorrect	0-Normal handling 1-Used left-hand only, used right-hand only, "Palmed" the wheel, hands at the bottom of the wheel, limited attempt to steer
89-91	Brake Performance	Original coding was: 0-Right foot (normal or typical brake performance) 1-Left foot 2-Covered brake 3-Left foot and covered brake 4-Limited attempt to use the brake These were recoded as follows:
89	Brake Performance - Percent not "normal"	0-Right foot 1-Left foot, covered brake, limited attempt
90	Brake Performance - Percent Right Foot, Covered Brake or Limited Attempt	0-Left Foot 1-Right foot, covered brake, left foot and covered brake in limited attempt

Variable Number and Description		Comments and Coding
91	Brake Performance-Percent Right foot, left foot, and covered brake and limited attempt	0-Left foot and brake 1-Right foot, left foot, covered brake, and limited attempt
92-94	Speed	Observation was made of the speed which the student usually maintained. This was originally coded as: 0-Speed within normal range 1-Speed above average 2-Limited attempt
92	Speed-Percent Not in Normal Range	This item was then recoded as follows: 0-Speed within normal range 1-Speed above average or limited attempt
93	Speed-Percent Limited Attempt	0-Speed within normal range or speed above average 1-Limited attempt
94	Speed-Percent over Normal Range	0-Speeds above average 1-Speed within normal range or limited attempt
95-100	Average Reaction Times for Braking and Steering	These variables are a re-calculation of 81-86. In the original scoring of reaction times, it was noted that there were a number of situations in which the student would not react at all during a fixed period of time, presumably because the situations were unobserved or the student did not understand what was required of him. Therefore, reaction times were recorded at the limit of 0.800 for steering or 0.600 for braking. The average reaction times, corrected for the failure to act within a given situation was obtained by calculating for each student the average of his reaction times excluding those in which the "clock ran out".

Variable Number and Description	Comments and Coding
	The formula for the mean reaction time for each student is $\bar{X} = \frac{\Sigma x}{n}$ Where X is reaction time, excluding those to which no reaction was observed. n is the number of times a reaction was observed. This has the effect of excluding the maximum values of 0.6000 seconds for brake reaction time and 0.800 for steering reaction time, thus providing an accurate estimate of reaction time for those situations to which the student reacted. Scoring is: Brake Reaction Time .001 - .599 Steering Reaction Time .001 - .799
101-130 Error Checks	These are binary records of behaviors in specific situations of the stress test. The figures shown in the table of means and standard deviations are based on percentage performing. correctly. Each item is scored: 0-Error 1-Correct Each situation was recoded and scored as it occurred.
131-149 Reaction Time	These are the individual reaction time situations for braking and steering contained in summary form in variables 81-86 and as averages for each student in variables 95-100

Variable Number and Description	Comments and Coding
131-140 Braking	.001-.600
141-149 Steering	.001-.800
150 Self Rated Expertness	Each student was asked to rate himself on the quality of his driving on a scale of 1-11, with 11 signifying a high degree of expertness and 1 a low score.
150-157 Accident Violation Reports	Self-reports and records obtained from the state on accidents and violations were used as described in detail in Chapter 5. In addition, combinations of reports were used to generate new variables in 155-157.
151 Accidents-Self Reported	0-One or more accidents reported 1-No accidents
152 Violations-Self Reported	0-One or more violations reported 1-No violations
153 Accidents-State Reported	0-One or more accidents reported in state records 1-No accidents
154 Violations-State Reported	0-One or more violations reported in state records 1-No violations
155 Accidents-Self and State Reported	0-One or more accidents reported either in the state records or in the self-report 1-No accidents reported on either record
156 Accidents or violations-State Reported	0-One or more accidents or violations reported in state records 1-No accidents or violations reported in state records
157 Combined Criterion for Accidents and Violations Self-State Reported	0-One or more accidents and/or violations reported in state records or in the self report form 1-No accidents or violations reported on either record

For the combined variables (155-157) no attempt was made to exhaust all of the possible combinations. The purpose in combining the accident/violation variables was to increase the reliability of the criterion as measures of driving behavior.

Variables Included in the Analyses

Variables 5-157 were included in the analysis for means and standard deviations, as shown in Table 9, page 55. This is a total of 153 variables. Correlations matrixes were obtained using Variables 5-100 and 150-157 for a total of 104 variables. Variables 101-149 are presented in summary form in other variables.

C. DIFFERENCES AMONG EMR'S AND NORMALS

MALES AND FEMALES

Table 9, page 55, shows the means and standard deviations for EMR's and Normals for the total group and for Males and Females for 153 variables. Differences in means or percentages (as appropriate) were calculated from this data. The table shows those differences that were significant at the 5%, 1% and .1% level of confidence. The z test was used as the test of statistical significance to determine differences in the means.

The data in Table 9, page 55, yields the following results:

Demographic and Background Characteristics

1. There is a larger percentage of females in the Normals group than in the EMR's, about 46% vs. 14% respectively.
2. EMR's tended to be older than the Normals.
3. Male Normals tended to be heavier than Male EMR's while female EMR's tended to be heavier than the Female Normals.
4. A larger percentage of the male Normals wore glasses than did the male EMR's.
5. A larger percentage of the female EMR's were right-handed compared with the female Normals.
6. More than half of the Normal students were enrolled in a College Preparatory or Academic Program, while less than 1% of the EMR's were enrolled in either of these programs.
7. A higher percentage of the Normals compared with EMR's tended to come from the suburbs or city (contrasted with farm, rural or town).
8. Normal students tended to come from higher socio-economic levels, as measured by Father's Occupation, than did EMR's.

Tests

9. On the Driver Evaluator tests (visual acuity, depth judgement and field of vision), those differences that were statistically significant distinguished between the female Normal and female EMR's with the Normals showing superior performance in each case.
10. On the Wilson Driver Selection tests, the average performance of the Normals exceeded that of the EMR's on every test. As shown in Table 9, page 55, many differences were statistically significant, however, the differences were more often statistically significant for the female than for the males.
11. On the Sixteen Personality Factor Scale, Normals compared with EMR's tended to score higher on the Affectothymia, Scholastic Mental Ability, Surgency, and Prasmic Scales. Differences on the other scales were not statistically significant.
12. Normals (total and female) tended to score higher on the Pennsylvania Driver Manual than did EMR's.
13. Normals scored higher on the Siebrecht Attitude Scale than did EMR's of either sex.

Driver Education and Driving Experience

14. A higher percentage of Normals had taken Driver Education (total group only) than did EMR's.
15. There were no significant differences between Normals and EMR's in miles driven per year or (with the exception of females) the amount of driving experiences.
16. Significantly more Normals (total group) had a driving restriction (presumably required to wear glasses) than did EMR's.

Stress Test

17. On the Stress Test, there were no significant differences between the Normals and EMR's on error counts (Variables 77-80, braking, steering, signal, speed). However, as shown on the Table, a large number of the reaction time measures distinguish between the Normals and EMR's, with the EMR's, as expected, reacting more slowly than the Normals.
18. On a number of observational items on the Stress Test, Variables 87-94), there were differences between Normals and EMR's in steering handling, brake performance and speed with, generally, Normals displaying superior performance to EMR's.

TABLE 9

Means (Percents) and Standard Deviations (S.D.) for 153 Variables for EMR's and Normals by Sex

Variable Number and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Female
	N=344	295	49	N=436	236	200
5. Percent Female	14.2+	--	--	45.9+	--	--
S. D.	35.00	--	--	49.89	--	--
6. Chronological Age in Months	213.9+	213.8+	214.7+	208.2+	209.4+	206.8+
S. D.	16.71	17.68	9.04	7.83	8.41	6.84
7. Height in Inches	67.4	67.9	63.8	67.1	69.2	64.5
S. D.	7.29	7.59	3.35	5.57	6.50	2.49
8. Weight	147.1+	150.3+	127.7*	140.7+	155.3+	123.5*
S. D.	25.89	25.10	22.01	24.49	21.65	14.41
9. Percent Wearing Glasses	28.3+	25.5+	44.9	38.3+	34.7+	42.5
S. D.	49.21	48.57	50.25	48.67	47.72	49.56
10. Percent Right-Handed	84.7	83.5	91.8*	86.7	87.3	86.0*
S. D.	37.61	37.80	27.66	34.00	33.38	34.79
11. Class in School	3.3	3.3	3.3	3.6	3.6	3.6
S. D.	0.78	0.78	0.75	0.54	0.55	0.52
12-13. School Program						
12. Percent Not in Special Education	5.8+	5.4+	8.2+	99.3+	99.6+	99.0+
S. D.	23.43	22.69	27.66	8.28	6.51	9.97
13. Percent in College Preparatory or Academic Program	0.6+	0.7+	0.0+	54.8+	45.3+	66.0+
S. D.	7.61	8.22	00.00	49.82	49.89	47.49
14-18. Residence						
14. Percent Town, Suburbs or City	62.5+	62.0	65.3+	71.1+	65.7	77.5+
S. D.	48.48	48.61	48.09	45.38	47.58	41.86
15. Percent Suburbs or City	32.3+	32.2*	32.7+	42.9+	37.3*	49.5+
S. D.	46.82	46.80	47.38	49.55	48.46	50.12
16. Percent Farm, Rural, Town or City	84.9+	83.7*	91.8+	72.2+	79.2*	64.0+
S. D.	35.87	36.97	27.66	44.83	40.65	48.12
17. Percent Farm, Rural, Town or Suburbs	82.8	84.1	75.5+	84.8	83.5	86.5+
S. D.	37.75	36.66	43.45	35.88	37.22	34.26
18. Percent Farm, Rural, Suburbs or City	69.8	70.2	67.4	71.8	71.6	72.0
S. D.	45.99	45.83	47.38	45.05	45.18	45.01

*Difference between EMR and Normal groups significant at the 5% level of confidence.

°Difference between EMR and Normal groups significant at the 1% level of confidence.

+Difference between EMR and Normal groups significant at the 0.1% level of confidence.

Variable Number and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Female
19. Father's Occupation	1.2+	1.3*	1.0+	2.3+	2.1*	2.5+
S. D.	0.97	0.99	0.73	1.19	1.20	1.16
20-29. Driver Evaluator						
20. Visual Acuity - Left	10.0	10.2	8.7	10.5	10.8	10.1
S. D.	3.10	3.04	3.16	2.92	2.79	3.04
21. Visual Acuity - Right	9.6	9.9	3.4°	10.7	10.6	10.7°
S. D.	3.69	3.62	3.89	2.84	2.98	2.68
22. Visual Acuity - Both	11.3	11.4	10.5*	12.1	12.2	12.1*
S. D.	2.44	2.39	2.65	1.94	1.91	1.98
23. Depth Judgement - Total	10.3	10.4	9.7	10.8	11.1	10.5
S. D.	3.11	3.07	3.35	2.88	2.84	2.89
24. Depth Judgement - Near	2.7	2.7	2.9	2.5	2.3	2.6
S. D.	1.84	1.83	1.93	1.68	1.68	1.68
25. Depth Judgement - Far	3.0	3.0	3.3	2.7	2.6	2.9
S. D.	1.83	1.81	1.92	1.66	1.61	1.71
26. Color Vision	0.0	0.0	0.0	0.0	0.0	0.0
S. D.	0.08	0.06	0.14	0.08	0.00	0.12
27. Field of Vision - Left	91.2*	91.6	88.4+	93.2*	93.2	93.2+
S. D.	9.18	7.78	14.91	4.51	4.07	4.99
28. Field of Vision - Right	92.0°	92.4	89.7+	94.1°	94.1	94.1+
S. D.	5.77	5.44	7.09	4.73	4.99	4.40
29. Field of Vision - Total	182.9+	183.7	178.1+	187.3+	187.2	187.4+
S. D.	13.66	11.90	20.94	8.45	8.21	8.75
30-51. Wilson Driver Selection Tests						
30. #1-Visual Attention - # Complete	9.7+	9.9	7.9+	12.7+	13.0	12.3+
S. D.	4.14	4.15	3.65	3.97	3.92	4.01
31. #1-Visual Attention - # Correct	7.6+	7.9	5.3+	11.2+	11.6	10.8+
S. D.	4.13	4.15	3.19	4.74	4.57	4.90
32. #1-Visual Attention - % Correct	77.6+	79.1	68.7+	86.4+	88.0	84.5+
S. D.	24.7	24.05	27.01	18.82	17.05	20.61
33. #2-Depth Visualization - # Complete	27.0+	27.0	27.0+	32.2+	32.5	31.9+
S. D.	9.48	9.65	8.53	8.96	9.66	8.07
34. #2-Depth Visualization -# Correct	16.2+	17.1	11.2+	25.4+	26.2	24.3+
S. D.	9.90	10.11	8.69	9.72	10.43	8.71
35. #2-Depth Visualization-% Correct	59.9+	62.5	44.4+	77.9+	79.7	75.7+
S. D.	26.89	26.34	25.15	17.25	16.74	17.63
36. #3-Recognition of Simple Detail - # Complete	87.5+	86.1+	95.6+	120.3+	113.2+	128.8+
S. D.	24.88	24.13	27.90	23.95	24.39	20.50
37. #3-Recognition of Simple Detail - # Correct	84.9+	83.5+	93.3+	118.4+	111.2+	126.9+
S. D.	24.64	23.85	27.75	23.74	24.15	20.23

	Variable Number and Description	E. M. R.			Normal		
		Total	Male	Female	Total	Male	Female
38.	#3 - Recognition of Simple Detail % Correct S.D.	96.3* 7.11	96.2 7.59	97.2 2.68	97.9* 2.32	97.7 2.34	98.0 2.28
39.	#4 - Recognition of Complex Detail - # Complete S.D.	69.2+ 17.00	68.2+ 16.78	75.2+ 17.28	104.1+ 22.11	97.3+ 21.13	112.1+ 20.52
40	#4 - Recognition of Complex - Detail - # Correct S.D.	63.4+ 16.51	62.5+ 16.13	68.8+ 17.91	100.1+ 21.85	92.5+ 20.40	109.1+ 20.04
41.	#4 - Recognition of Complex Detail - % Correct S.D.	91.7+ 8.66	91.8 8.45	91.2+ 9.87	95.9+ 5.23	94.9 6.57	97.0+ 2.48
42.	#5 - Eye-Hand Coordination - # Complete S.D.	86.3+ 25.06	86.1 24.93	87.2+ 26.07	100.2+ 23.62	99.8 24.51	100.6+ 22.59
43.	#5 - Eye-Hand Coordination - # Correct S.D.	73.3+ 19.11	73.3 19.37	73.4+ 17.65	87.5+ 18.21	85.5 18.96	89.8+ 17.05
44.	#5 - Eye-Hand Coordination - % Correct S.D.	86.3* 10.15	86.4 10.09	85.9° 10.63	88.3* 10.21	86.7 11.09	90.2° 8.74
45.	# 6 Steadiness - # Complete S.D.	11.5+ 3.79	11.5 3.80	11.4+ 3.76	14.1+ 3.38	13.7 3.50	14.5+ 3.19
46.	#6 - Steadiness - # Correct S.D.	9.5+ 3.96	9.5 3.90	9.5+ 4.32	12.8+ 3.76	12.1 3.84	13.7+ 3.47
47.	#6 - Steadiness - % Correct S.D.	83.3+ 23.74	83.5 23.46	82.4+ 25.62	91.3+ 16.37	89. 18.96	94.1+ 12.1
48.	Wilson Test - Number of Tests "Passed" in Wilson Formula S.D.	2.5+ 1.39	2.5 1.40	2.6° 1.31	3.9+ 1.35	3.8 1.38	4.0° 1.30
Wils 49.	Wilson Test - Total Completed S.D.	290.9+ 59.80	288.7+ 59.65	304.2+ 59.52	383.4+ 59.12	369.6+ 60.93	399.7+ 52.56
50.	Wilson Test - Total Correct S.D.	254.8+ 55.68	253.7+ 56.10	261.5+ 53.11	354.8+ 57.14	339.4+ 57.10	373.0+ 51.69
51.	Wilson Test - % Correct S.D.	87.6+ 7.31	87.9 7.26	86.2+ 7.48	92.6+ 5.48	92.0 5.13	93.3+ 5.17
52.-56.	Sixteen Personality Factor Scale						
52./	Affectothymia S.D.	3.9° 1.70	3.7* 1.60	5.5 1.43	5.1° 1.93	4.1* 1.81	6.2 1.40
53.	B. Scholastic Mental Capacity S.D.	4.7+ 1.64	4.7 1.65	4.5+ 1.61	7.0+ 1.37	6.8 1.46	7.2+ 1.23
54.	C. Ego Strength S.D.	4.1 1.60	4.1 1.60	3.9 1.66	3.7 1.65	4.0 1.68	3.3 1.53

Variable Number and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Female
55. E. Dominance	3.3	3.4	2.8	3.7	3.9	3.5
S.D.	1.47	1.46	1.46	1.77	1.76	1.77
56. F. Surgency	5.0*	4.9	5.1	5.9*	5.7	6.2
S.D.	1.67	1.71	1.39	1.80	1.78	1.78
57. G. Superego Strength	4.5	4.4	5.2	4.5	4.4	4.5
S.D.	1.61	1.57	1.66	1.93	1.90	1.97
58. H. Parmic	3.4	3.5	3.1	3.8	3.5	4.0
S.D.	1.75	1.70	1.99	2.25	2.19	2.30
59. I. Prasmic	2.9*	2.4+	5.7	4.1*	2.3+	6.2
S.D.	1.94	1.57	1.47	2.70	2.02	1.79
60. L. Protension	3.6	3.7	3.1	4.2	4.3	4.0
S.D.	1.67	1.69	1.44	1.87	1.84	1.90
61. M. Autic	3.6	3.6	3.4	3.5	3.4	3.6
S.D.	1.53	1.52	1.60	1.38	1.43	1.32
62. N. Shrewdness	4.0	4.0	4.4	4.0	4.1	3.9
S.D.	1.37	1.37	1.31	1.32	1.34	1.30
63. O. Guilt Proneness	4.3	4.1	4.9	4.5	4.1	5.0
S.D.	1.65	1.61	1.74	1.76	1.69	1.72
64. Q1. Radicalism	3.7	3.7	3.6	4.2	4.0	4.5
S.D.	1.50	1.48	1.63	1.60	1.55	1.64
65. Q2. Self-Sufficiency	3.7	3.7	3.4	3.1	3.4	2.8
S.D.	1.69	1.63	2.01	2.02	2.08	1.90
66. Q3. High Self-Concept Control	4.6	4.5	4.8	4.0	4.0	3.9
S.D.	1.52	1.52	1.50	1.68	1.65	1.72
67. Q4. High Ergic Tension	3.4	3.4	3.7	3.9	3.4	4.4
S.D.	1.73	1.71	1.85	1.97	1.85	1.99
68. Pennsylvania Drivers Manual	49.3+	50.3	43.7+	64.8+	67.2	61.9+
S.D.	14.75	14.65	14.21	12.45	12.44	11.87
69. Siebrecht Attitude Scale	127.6+	127.9*	125.7+	151.9+	148.4*	156.0+
S.D.	28.01	28.50	25.03	21.36	22.79	18.77
70-73. Driver Education						
70. Percent Not Taking Combined Classroom and Behind Wheel Instruction	62.2+	65.4	42.9	46.1+	45.8	46.5
S.D.	48.56	47.64	50.00	49.90	49.93	50.00
71. Percent With Driver Education	58.7+	55.9	75.5	73.6+	73.7	73.5
S.D.	49.30	49.73	43.45	44.12	44.10	44.24
72. Percent No Driver Education or Classroom Only	56.7	60.0	36.7	40.6	39.0	42.5
S.D.	49.62	49.07	48.71	49.16	48.87	49.50
73. Percent No Driver Education or Behind Wheel Only	46.8+	49.5	30.6	31.9+	33.0	30.5
S.D.	49.97	50.08	46.57	46.65	47.14	46.16

Variable Number and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Female
74. Miles Driven Per Year	2.4	2.5	1.8	2.4	3.0	1.7
S.D.	1.66	1.67	1.49	1.51	1.58	1.08
75. Driving Experience In Months	12.9	13.2	10.9*	11.8	13.0	10.3*
S.D.	9.76	9.95	8.27	7.44	7.92	6.55
76. Percent With Driving Restriction	23.3+	21.7	32.7	38.5+	37.3	40.0
S.D.	42.31	41.29	47.38	48.72	48.46	49.11
77-149. Stress Test						
77. Braking Errors	11.2	11.3	10.7	11.1	11.4	10.7
S.D.	2.95	2.88	3.38	2.54	2.69	2.29
78. Steering Errors	3.6	3.7	3.5	3.7	3.7	3.7
S.D.	1.28	1.25	1.45	1.29	1.23	1.36
79. Signal Errors	1.7	1.7	2.0	1.5	1.5	1.5
S.D.	1.09	1.03	1.40	0.82	0.84	0.80
80. Speed Errors	2.5	2.6	2.4	2.6	2.5	2.6
S.D.	0.81	0.79	0.95	0.77	0.83	0.69
81. Reaction Time - Brakes - 5 Immediate Situations	1.108+	1.064+	1.369+	0.902+	0.873+	0.936+
S.D.	.399	.360	.510	.311	.313	.307
82. Reaction Time Brakes - Apparent Situation	1.630+	1.583	1.913+	1.356+	1.369	1.340+
S.D.	.558	.555	.491	.553	.573	.528
83. Reaction Time Brakes - Total	2.742+	2.649+	3.302+	2.278+	2.242+	2.321+
S.D.	.872	.820	968	.820	.774	.871
84. Reaction Time Steer - Left	1.620+	1.577+	1.880+	1.491+	1.450+	1.539+
S.D.	.914	.925	.804	.880	.864	.898
85. Reaction Time Steer - Right	3.158+	3.160+	3.149+	3.124+	3.162+	3.080+
S.D.	.703	.687	.798	.667	.604	.734
86. Reaction Time Brakes and Steering Total 19 Situations	7.473+	7.341+	8.272.+	6.981+	6.851+	7.134
S.D.	1.711	1.644	1.896	2.854	1.422	3.921
87. Percent Using Seat Belt	2.9	3.1	2.0	2.8	3.0	2.6
S.D.	16.82	17.23	14.29	16.41	17.00	15.73
88. Percent Incorrect Steering Handling	9.6+	8.1	18.4+	3.5+	4.2	2.6+
S.D.	29.49	27.38	39.12	18.28	20.19	15.73
89. Braker Performance - Percent Not "Normal"	12.8+	11.5	20.4+	4.6+	5.5	3.6+
S.D.	33.45	31.99	40.72	20.97	22.86	18.49
90. Brake Performance - Right Foot, Covered Brake or Limited Attempt	94.8*	94.6	95.9*	98.0*	96.6	99.6*
S.D.	22.30	22.69	19.99	13.88	18.14	5.30

Variable Number and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Female
91. Brake Performance - Percent Left Foot and Covered Brake and Limited Attempt	98.0	97.6	100.0°	97.8	98.3	97.1°
S.D.	14.14	15.25	00.00	14.66	12.94	16.47
92. Speed - Percent Not in Normal Range	10.2+	9.2	16.3+	2.4+	1.7	3.1+
S.D.	30.27	28.88	37.34	15.03	12.94	17.17
93. Speed - Percent Limited Attempt	3.5+	2.0	12.2+	0.1+	0.0	0.1+
S.D.	18.38	14.14	33.12	01.20	00.00	01.77
94. Speed - Percent Over Normal Range	93.3°	92.9	95.9	97.5°	98.3	96.6
S.D.	25.01	25.76	19.99	15.38	12.94	17.84
95. Average Reaction Time - Brakes Immediate Situation	.182+	.176°	.214+	.159+	.153°	.167+
S.D.	.056	.051	.074	.047	.043	.050
96. Average Reaction Time - Brakes Apparent Situation	.241+	.237	.262+	.209+	.211	.206+
S.D.	.080	.077	.094	.072	.070	.075
97. Average Reaction Time - Brakes Total	.208+	.203	.237+	.181+	.178	.185+
S.D.	.054	.050	.069	.048	.042	.054
98. Average Reaction Time - Steering Left	.010	.010	.008	.010	.009	.010
S.D.	.031	.032	.020	.032	.031	.034
99. Average Reaction Time - Steering Right	.117	.123	.085+	.122	.128	.114+
S.D.	.116	.118	.098	.103	.103	.104
100. Average Reaction Time - Brakes and Steering - Total	.061	.064	.037	.060	.062	.058
S.D.	.073	.065	.059	.056	.057	.056
101-130. Error Checks - Percent Correct						
101. Parking Brake	97.0	97.3	94.9*	98.0	97.5	98.8*
S.D.	15.55	14.61	20.39	12.87	14.72	10.25
102. Left Turn Signal	96.4	96.6	94.9*	97.6	96.6	98.8*
S.D.	17.21	16.65	20.39	14.47	17.23	10.25
103. Medium Brake	67.9	67.8	68.4	66.2	65.7	66.8
S.D.	46.17	46.25	46.14	47.09	47.24	47.03
104. Medium Brake	38.8°	40.7	27.6+	44.8°	48.7	40.2+
S.D.	48.24	48.68	44.27	49.53	49.77	48.97
105. 15 M.P.H.	85.3	86.8	76.5	83.1	84.3	81.8
S.D.	34.66	33.16	41.89	37.13	35.99	38.48
106. Light Bake	89.4	89.8	86.7	88.9	88.1	89.8
S.D.	29.94	29.41	33.10	31.06	31.91	30.09
107. Light Brake	96.1	96.3	94.9	95.7	95.3	96.2
S.D.	17.97	17.57	20.39	19.52	20.35	18.54

Variable Number and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Female
108. Light Brake	85.00	84.4	88.8°	82.4	83.5	81.2°
S.D.	34.95	35.63	30.64	37.74	36.79	38.89
109. Zero M.P.H.	85.9	95.1*	90.8	82.9	77.5*	89.2
S.D.	34.05	34.96	27.80	37.34	41.43	30.75
110. Light Brake	71.1	71.9	66.3	71.9	75.8	67.2
S.D.	44.80	44.47	46.92	44.71	42.52	46.85
111. Left Turn Signal	18.5+	17.0	27.6+	10.8+	8.9	12.8+
S.D.	38.14	36.90	44.27	30.48	27.97	33.15
112. 15 M.P.H.	85.6*	87.5	74.5+	89.3*	88.6	90.2+
S.D.	34.36	32.39	43.14	30.48	31.39	29.42
113. Medium Brake	72.8+	70.5*	86.7+	65.9+	71.6*	59.2+
S.D.	43.93	45.11	33.10	47.17	44.83	49.07
114. Right Turn Signal	31.2+	30.8	33.7+	24.4+	26.3	22.2+
S.D.	45.83	45.71	46.92	42.71	43.74	41.47
115. Brake Off	5.1	5.4	3.1	4.2	4.7	3.8
S.D.	20.73	21.54	15.00	19.53	20.36	18.55
116. Left Turn Signal	19.6+	13.6	25.5+	12.0+	11.9	12.2+
S.D.	39.08	38.35	43.15	32.18	31.91	32.58
117. Hard Left Steer	64.4*	62.7	74.5+	59.1*	61.0	56.8+
S.D.	47.38	47.91	43.14	48.96	48.55	49.48
118. Light Brake	57.4+	58.0	54.1+	40.9+	49.6+	30.8+
S.D.	48.96	48.92	49.57	48.96	49.78	46.06
119. Center Steer	45.5	46.4	39.8*	46.4	45.8	47.2*
S.D.	49.32	49.44	48.66	49.67	49.60	49.86
120. Medium Brake	67.9	68.1*	66.3	70.8	76.7*	63.8
S.D.	46.17	46.12	46.92	45.25	41.99	48.00
121. Light Brake	94.9	95.9	88.8+	96.2	95.8	96.8+
S.D.	20.72	18.44	30.64	18.41	19.37	17.23
122. Center Steer	37.6	37.6	37.8	38.6	38.6	38.8
S.D.	47.95	48.00	48.17	48.48	48.45	48.65
123. Medium Brake	73.7	75.6*	62.2	73.1	79.7*	65.2
S.D.	43.47	42.43	48.17	44.13	39.94	47.54
124. Slight Right	88.5°	88.8	86.7	93.5°	95.8	90.8
S.D.	31.05	30.75	33.10	24.21	19.37	28.72
125. Medium Brake	59.4	59.6	58.2	57.9	60.2	55.2
S.D.	48.61	48.62	49.05	49.16	48.73	49.66
126. Right Turn Signal	12.4+	11.2	19.4+	6.5+	7.2	5.8+
S.D.	32.11	30.76	38.95	24.22	25.29	22.93
127. Hard Right Steer	86.2	87.5	78.6	86.4	89.8	82.2
S.D.	33.74	32.39	40.50	33.99	29.75	38.06
128. Center Steer	47.5	49.2	37.8+	48.7	47.0	50.8+
S.D.	49.45	49.56	481.17	49.78	49.70	49.93

Variable Dumber and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Total
129. Medium Brake	79.2+	80.3	72.5+	85.4+	86.9	83.8+
S.D.	39.95	39.16	44.26	34.94	33.37	36.73
130. Light Brake	73.1	73.9	68.4	70.3	69.5	71.2
S.D.	43.78	43.41	46.41	45.46	45.79	45.16
131. Reaction Time - Brake Situation 1	.424+	.418	459+	.350+	.343	.359+
S.D.	.153	.153	.145	.160	.161	.159
132. Reaction Time - Brake Situation 2	.227+	.222	.256+	.196+	.190	.204+
S.D.	.107	.105	.116	.078	.070	.086
133. Reaction Time - Brake Situation 3	.190+	.180	.244+	.161+	.155	.167+
S.D.	.092	.082	.126	.063	.053	.073
134. Reaction Time - Brake Situation 4	.137+	.124	.214+	.102+	.099	.105+
S.D.	.132	.116	.187	.099	.111	.084
135. Reaction Time - Brake Situation 5	.126+	.115*	.195+	.093+	.086*	.101+
S.D.	.104	.090	.146	.077	.082	.071
136. Reaction Time - Brake Situation 6	.337+	.332	.367+	.308+	.302	.316+
S.D.	.178	.179	.171	.180	.180	.180
137. Reaction Time - Brake Situation 7	.338+	.319	.452+	.231+	.237	.223+
S.D.	.240	.237	.224	.226	.226	.227
138. Reaction Time - Brake Situation 8	.339+	.334	.373+	.292+	.299	283+
S.D.	.216	.215	.221	.207	.214	.199
139. Reaction Time - Brake Situation 9	.268+	.259*	.321+	.200+	.212*	.187+
S.D.	.179	.175	.192	.150	.150	.150
140. Reaction Time - Brake Situation 10	.349+	.340	.404+	.320+	.214	.328+
S.D.	.118	.116	.118	.114	.118	.109
141. Reaction Time - Left Steer Situation 1	.178+	.180	.168+	.088+	.090	.086+
S.D.	.330	.331	.324	.248	.251	.245
142. Reaction Time - Left Steer Situation 2	.472+	.458*	.556+	.395+	.411*	.375+
S.D.	.392	.395	.371	.399	.400	.397
143. Reaction Time - Left Steer Situation 3	.420	.411+	.478*	.424	.397+	.456*
S.D.	.396	.397	.393	.396	.397	.393
144. Reaction Time Left Steer Situation 4	.549°	.528*	.678+	.566°	.552*	.583+
S.D.	.363	.370	.282	.354	.360	.348

80

Variable Number and Description	E. M. R.			Normal		
	Total	Male	Female	Total	Male	Female
145. Reaction Time - Right Steer Situation 1	.792*	.793*	.784	.786*	.792*	.778
S.D.	.078	.070	.114	.096	.071	.120
146. Reaction Time - Right Steer Situation 2	.740	.739	.751*	.740	.742	.738
S.D.	.207	.209	.194	.207	.203	.213
147. Reaction Time - Right Steer Situation 3	.477	.478*	.471	.476	.490*	.459
S.D.	.356	.354	.372	.351	.354	.347
148. Reaction Time - Right Steer Situation 4	.427+	.424	.442*	.404+	.393	.415*
S.D.	.305	.302	.324	.300	.288	.315
149. Reaction Time-Right Steer Situation 5	.723*	.727+	.702*	.712*	.745+	.673*
S.D.	.233	.228	.265	.249	.201	.292
150. Self Rated Expertness	5.9	5.9	5.8	6.8	7.0	6.6
S.D.	2.88	2.89	2.82	2.08	2.24	1.86
151-157. Accidents and Violations						
151 Percent No Accidents - Self-Reported	66.6°	64.4	79.6+	56.2°	56.4	56.0+
S.D.	47.24	47.96	40.72	49.67	49.70	49.76
152. Percent No Violations - Self-Reported	85.2	83.7	93.9	87.2	82.6	92.5
S.D.	35.59	36.97	24.22	33.50	37.97	26.41
153. Percent No Accidents - State-Reported	86.0	85.1	91.8	85.1	82.6	88.0
S.D.	34.70	35.68	27.66	35.66	37.97	32.58
154. Percent No Violations - State-Reported	86.9	84.7	100.0	91.3	87.3	96.0
S.D.	33.77	36.02	00.00	28.24	33.38	19.65
155. Percent No Accidents - Self and State Reported	65.7°	63.4*	79.6+	54.8°	54.7*	55.0+
S.D.	47.54	48.26	40.72	49.82	49.89	49.87
156. Percent No Accidents or Violations State	78.2	75.9	91.8	78.7	72.5	86.0
S.D.	41.35	42.82	27.66	41.01	44.77	34.79
157. Percent Combined - No Accidents or Violations - State or Self Reported	57.8	55.3	73.5°	50.9	48.3	54.0°
S.D.	49.45	49.81	44.61	50.05	50.08	49.96

D. CORRELATION ANALYSIS

Predictors of Accidents and Violations

To predict accidents and violations, zero order correlations and multiple correlation coefficients were calculated for six groups of subjects, including total EMR's, Male EMR's, Female EMR's, total Normals, Male Normals, and Female Normals. The correlation matrixes of relationships between variables for the various groups are presented in Appendix O.

The purpose in obtaining separate correlation matrixes for each of the six groups was to determine whether or not the patterns of predictor-criterion correlations were the same or different for each of the groups. Inasmuch as an important part of this study was to examine the data for different patterns of relationships between EMR's and Normals, it appeared mandatory to carry out the correlation analyses on each group separately. Appendix P, shows the relationship of the predictor variables to the seven criterion variables (accidents and violation reports) for each group.

Table 10, page 69, summarizes the results of the correlation analysis. This table shows those groups for which correlation coefficients were statistically significant at the 5% level of confidence or greater. The entries are the group numbers taken from each set of correlations as follows:

Group 1. Total EMR
Group 2. Male EMR
Group 3. Female EMR
Group 4. Total Normal
Group 5. Male Normal
Group 6. Female Normal

This table is useful in summarizing the correlation data to determine whether or not there are similar or dissimilar patterns of predictor criterion correlations for each of the groups. For example, 1, 2, and 3 indicated that there is a significant correlation for Total EMR's, Male EMR's and Female EMR's, but that the correlation coefficients for Normals were not statistically significant. Entries in the Table of 2 and 4 indicate that Male EMR's and Male Normals had statistically significant correlation coefficients while all other groups did not. The Table is useful in examining the number of significant correlation coefficients, the particular groups for which significance was obtained, and the particular criterion variables with which a given predictor correlated. Table 11, page 71, shows for each group the number of

statistically significant correlations with each criterion variable, summarized from Table 10. Also shown in Table 11 is the magnitude of the correlation coefficient required for significance at the 5% level of confidence.

An examination of the tables in Appendix P shows that the significant correlations tended to be low, generally in the range of 0.10 to 0.25. The correlations for female EMR's ranged as high as 0.45, however, it should be noted that the small sample size for this group (N=49) suggests that these correlations have a high standard error of estimate and may be atypical.

The correlations obtained, although low in magnitude, are not likely to have been obtained by chance alone. At the 5% level of confidence, 5 correlations in any group of 100 could be attributed to chance factors. Inspection of Table 11 shows that in 34 of the 42 cells, there were 5 or more correlations that were significant. Each set of correlations was based on 97 variables.

Examination of Tables 10 and 11 clearly illustrates the uniqueness of correlations for each of the six groups. Only a very small number of predictor variables (shown in Table 10) include more than one group entry, indicating that only in one of the groups was there a statistically significant correlation. In very few of the entries are there four or more groups with significant correlations.

Multiple and Partial Correlation Analysis

As the results of the zero order correlation analysis support the idea that there are different patterns of correlations among EMR's and Normals for each of the criterion variables, multiple correlations and partial correlation analyses were obtained separately for a number of different groups. For practical reasons, it was decided to limit the number of multiple correlation and partial correlation analyses to be carried out. From a theoretical standpoint, it seemed advisable to single out those criteria that best represent accident/violation behaviors.

Multiple correlation coefficients were obtained for 13 sets of data namely:

1. State-reported accidents (Variable 153). Five multiple correlation coefficients, EMR-total, Male and Female, Normals - total and Male only. (Only one zero order correlation coefficient was significant for Normal Females using this criterion, precluding the calculation of a multiple correlation coefficient.)

2. Combined criterion (Variable 157)- six multiple correlation coefficients. Whether or not there was an accident or violation reported either by the state or by the individual.
3. State-reported violations (Variable 154). One multiple correlation- Total Normal.
4. State-reported accidents or violations (Variable 156). One multiple correlation coefficient- Female EMR.

This set of multiple correlations was selected for calculation as it was felt that the primary and most important criterion was state-reported accidents. Examination of Table 11, page 71, showed that the largest number of correlations, with two exceptions, occurred with Variable 157, the combined criterion. The other two combinations were used in those cases where there were a larger number of significant correlations than in the combined criterion or in state-reported accidents. It was felt that this approach would take into account the most "objective" of the criterion, state-reported accidents, and would take account of self reports and violations in a single criterion by using the combined criterion variable. The results of the multiple correlations are presented in Table 12, page 72.

The results of the multiple correlations, as presented in Table 12, page 72, shows the number of variables used in the specific multiple correlation coefficients and the sample size of each group. The specific variables and zero order correlation coefficients are shown in Table 14, page 74.

Examining further the multiple correlation coefficients, it is worth noting that in all comparisons between the multiple correlation coefficients of EMR's and Normals that the multiple correlations are larger for EMR's than for Normal students. However, as shown in Table 13, page 73, the differences in the multiple correlations are significantly different only for total EMR's vs. total normals.

Multiple correlations were obtained with variables 154, 156 and 157, to determine whether or not the use of combined criterion of driving behavior, namely, a combination of accident and violation reports, would prove more reliable and hence yield a higher multiple correlation than state reported accidents alone. Comparing the results for variables 157 and 153, it can be seen that, with the exception of Female EMR's, the multiple correlations with 157 are larger than with 153. However, as shown in Table 13, page 73, the differences were significant only for female EMR's. (This observation corresponds to the number of variables used in the multiple correlation for EMR's, 8 for state-reported accidents and only 4 for the combined accidents violation criteria. For female EMR's, it is also interesting to note that variable 156, state-reported accidents and violations combined,

yielded a lower multiple correlation coefficient than did state-reported accidents alone. For the total group, the multiple correlation for State-Reported Violations was .279 using 13 variabies, slightly smaller than variable 157 and somewhat larger than the multiple correlation for State-Reported Accidents.)

Generally, it can be concluded that there are differences between EMR and Normal groups in the extent to which accident/violation criteria can be predicted. In addition, using violations as well as accidents, and self as well as state reports, results in a modest increase in the multiple correlation coefficients resulting presumably, from the greater reliability of the criterion.

Table 14, page 74, shows the zero order correlation coefficients used in calculating the multiple correlations and partial correlations. This table is helpful in examining the results for each of the groups and for comparing the results for each criterion, State-Reported Accidents vs. Combined Accident Violation criterion.

Sign reversals were examined to judge whether the correlations represent different patterns of relationship for the groups being compared or whether the correlations might have arisen by accident. Sign reversals include those situations in which a positive correlation might be found for normal students while a negative correlation might be found for EMR's; positive for Males and negative for Females; positive for one criterion variable and negative for another criterion variable. There are sign reversals in only two of the variables, Variables 48 and 72. With only two sign reversals, the overall correlational data cannot be placed in question as sign reversals might arise in two cases out of 56 predictor variables by chance only.

Table 15, page 78, showing the beta weights for each criterion variable, group and predictor variable, and underscores the uniqueness of the groups. The beta weights show the relative contribution of each variable to its respective multiple correlation coefficient. Negative beta weights show a negative contribution of the variable and positive weights a positive contribution to the multiple correlation correlation.

Partial correlation analyses were carried out for the same 13 groups as the multiple correlation analyses. The detailed results of these analyses are presented in Table Q-1 through Q-13 in Appendix Q. The variables used in each analysis are those that proved to be statistically significant in terms of their correlation with the accident/violation criterion in question. The tables shown in Appendix Q present the results in each EMR or Normal group and State-Reported Accidents or the Combined Criterion.

In examining this data, it is most useful to determine the number of partial correlations in which the original correlation is reduced to a non-significant level. This data is summarized in Table 16, page 82. Overall, then, it would appear that the variables in the analysis tended to be independent; that is, partialling out a third variable did not very often reduce the original correlation to an insignificant level.

TABLE 10

ACCIDENT VIOLATION VARIABLE

GROUP-SUMMARY OF SIGNIFICANT CORRELATIONS BETWEEN INDEPENDENT VARIABLES

WITH CRITERION VARIABLES

INDEPEND. VARIABLES	SELF REPORT ACC. 151	SELF REPORT. VIOL. 152	STATE REPORT. ACC. 153	STATE REPORT. VIOL. 154	ACC. SELF AND STATE 155	VIOL. SELF AND STATE 156	COMBINATION ACC. AND VIOL. SELF AND STATE 157
6		4-5	4	4-5	4	4-3	4-5
7		4		4		4	
8	3	4		4	3		
9							3
10							
11	1-2-3-5	1-2	1-2	1-2-5	1-2-3-5	1-2-5	1-2-3-6
12	1-4	6	1-3		1	3	
13				4-5			
14			6				
15			1-3	2		1-3	
16	1-2		1-3		1	3	1-2
17				5	5	5	4-5
18	5				5		
19	3	6	1-3		3	3	
20		5					1
21		1	1-2				1-2
22		5					
23		3					
24		3-5					1
25						6	
26							
27		5		5		5	5
28	6			1	6		6
29				4-5			
30			2				
31			2	1			
32		6		1			
33							
34		1		1-2			
35				1-2			1
36	4-5		1-2	4			
37	5			4			
38			4			4	5
39				4			
40				4		4	
41		1					
42			1-3			3	
43							
44		2-4					
45			4-5			4	
46			4-5			4-5	4-5
47		6					5
48	1-2	1-2	4-5	1-2	1-2		1-2

TABLE 10(continued)

ACCIDENT VIOLATION VARIABLE

GROUP-SUMMARY OF SIGNIFICANT CORRELATIONS BETWEEN INDEPENDENT VARIABLES

WITH CRITERION VARIABLES

	151	152	153	154	155	156	157
49			1-3	4	5	3	
50				4			
51		1-2	1	1-2		1-2	1-2
68			3			3	
69	3-4		3		3	3	
70	6				6		6
71	6				4-6		6
72					6	1-2	1-6
73	6				6		6
74					5		5
75	4-5-6	4-5	4	4-5	4-5-6	4-5	4-5-6
76	3				3		3
77	1-2				1-2		1-2-4
78	1-2				1-2		1-2-4
79	1-2				1-2		1-2-4
80	1-2				1-2		1-2-4
81	1-2	1	1-2	1-2	1-2	1-2	1-2
82							
83				1		1	1-2
84			5			5	
85					5		5
76			5	1	1		1-2
87							
88							
89		1-2					
90		3					1
91							
92							
93							
94							
95		1-2		1-2		1-2	
96				1-2			
97		1-2		1-2		1-2	2
98						1-2	2
99	1-2-3-5		1-2	4-5	1-2-3-5	1	1-2-3-5
100	1-2-3		1-2		1-2-3	1-2	1-2
131						4	

1-Total E.M.R. Group
2-Male E.M.R. Group
3-Female E.M.R. Group
4-Total Normal Group
5-Male Normal Group
6-Female Normal Group

TABLE 11

Summary of Number of Predictor/Criterion Correlation Coefficients

(of 97 predictors with 7 criteria)

Satistically Significant at the .05 Level of Confidence

Group	r.05*	N	Criterion Variable						
			Acc. Self 151	Vio. Self 152	Acc. State 153	Vio. State 154	Acc. S & S 155	A&V State 156	Combined 157
1. Total EMR	.107	344	8	10	12	14	14	11	19
2. Male EMR	.113	295	10	7	7	10	9	8	16
3. Female EMR	.273	49	7	3	8	0	7	8	4
4. Total Normal	.094	436	4	5	6	13	3	8	8
5. Male Normal	.125	236	6	6	5	8	8	7	10
6. Female Normal	.138	200	5	4	1	0	6	1	7

* Magnitude of Correlation Coefficient required for significance at the 5% Level of Confidence.

89

TABLE 12

Multiple Correlation Coefficients (R) by Group and Selected Criterion Variables

Group	N	Criterion Variable			
		#153 State Reported Accidents	#157 Combined Accident/ Violations Self & State	#154 State Reported Violations	#156 State Reported Accidents or Violations
1. Total EMR	344	.422	.444	*	*
# Variables in R		12	19	*	*
2. Male EMR	295	.320	.419	*	*
# Variables in R		8	16	*	*
3. Female EMR	49	.794	.489	*	.662
# Variables in R		8	4	*	8
4. Total Normal	436	.207	.299	.279	*
# Variables in R		6	8	13	*
5. Male Normal	236	.273	.385	*	*
# Variables in R		5	10	*	*
6. Female Normal	200	*	.317	*	*
# Variables in R		*	7	*	*

* R NOT OBTAINED.

TABLE 13

Significance of Difference in Multiple Correlation Coefficients

Groups and Criterion Variable	Correlation 1*	Correlation 2*	Z transformation 1*	Z transformation 2*	$Z_{T_1}-Z_{T_2}$	$\frac{Z_{T_1}-Z_{T_2}}{\frac{1}{N_1-3}+\frac{1}{N_2-3}}$	Significance
Group Comparison							
# 153 (1) (2)							
TEMR vs. T Norm	.422	.207	.450	.210	.240	3.33	.1%
MEMR vs. M Norm	.320	.273	.332	.280	.052	0.59	n.s.
# 157 (1) (2)							
TEMR vs. T Norm	.444	.299	.472	.308	.164	2.28	5%
MEMR vs. M Norm	.419	.385	.446	.406	.040	0.45	n.s.
FEMR vs. F Norm	.489	.317	.535	.328	.207	1.26	n.s.
Criterion Comparison (1) (2)							
TEMR - 157 vs. 153	.444	.422	.472	.450	.022	0.29	n.s.
MEMR - 157 vs. 153	.419	.320	.446	.332	.114	1.37	n.s.
FEMR - 157 vs. 153	.459	.794	.535	1.083	-.548	-2.62	1%
FEMR - 156 vs. 153	.662	.794	.797	1.083	-.286	-1.37	n.s.
FEMR - 156 vs. 157	.662	.489	.797	.535	.262	1.25	n.s.
T Norm - 157 vs. 153	.299	.207	.308	.210	.098	1.44	n.s.
T Norm - 154 vs. 153	.279	.207	.287	.210	.077	1.13	n.s.
T Norm - 154 vs. 157	.279	.299	.287	.308	-.021	-0.31	n.s.
M Norm - 157 vs. 153	.385	.273	.406	.280	.126	1.35	n.s.

* Refers to group or criterion in left column

TABLE 14

Zero Order Correlation Coefficients Used in Calculating Multiple Correlation Coefficients and Partial Correlation Coefficients

Criterion Variable and Group	Predictor Variable														
	6	7	8	9	11	12	13	15	16	17	19	20	21	24	27
#153-State-Reported Accidents															
1. Total EMR					-.155	-.115		-.117	.111				-.123		
2. Male EMR					-.169								-.128		
3. Female EMR						-.456		-.428	.456		-.393				
4. Total Normal	-.101														
5. Male Normal															
#154-State-Reported Violation															
1. Total Normal	-.157	-.103	-.094				.113								
#156-State-Reported Accidents or Violations															
1. Female EMR						-.456		-.428	.456		-.392				
#157-Combined Accidents or Violations State- or Self-Reported															
1. Total EMR					-.233				.149			-.113	-.118	.116	
2. Male EMR					-.233				.139				-.113		
3. Female EMR				-.294	-.279										
4. Total Normal	-.108									-.095					
5. Male Normal	-.187									-.186					-.132
6. Female Normal					-.140										

TABLE 14 (continued)

Zero Order Correlation Coefficients Used in Calculating Multiple Correlation Coefficients and Partial Correlation Coefficients

Criterion Variable and Group	Predictor Variable														
	28	29	30	31	35	36	37	38	39	40	42	45	46	47	48
#153-State-Reported Accidents															
1. Total EMR						.116					.109				
2. Male EMR			.116	.116		.115									
3. Female EMR											.283				
4. Total Normal								.104				.129	.127		.094
5. Male Normal												.158	.141		.130
#154-State-Reported Violation															
1. Total Normal		-.099				.126	.132		.118	.125					
#156-State-Reported Accidents or Violations															
1. Female EMR											.283				
#157-Combined Accidents or Violations State- or Self-Reported															
1. Total EMR					-.123										-.128
2. Male EMR															-.145
3. Female EMR															
4. Total Normal													.095		
5. Male Normal								.141				.130	.147		
6. Female Normal	-.144														

TABLE 14(continued)

Zero Order Correlation Coefficients Used in Calculating Multiple Correlation Coefficients and Partial Correlation Coefficients

Criterion Variable and Group	Predictor Variable														
	49	50	51	68	69	70	71	72	73	74	75	76	77	78	79
#153-State-Reported Accidents															
1. Total EMR	.135		-.151												
2. Male EMR															
3. Female EMR	.274			-.315	-.484										
4. Total Normal											-.106				
5. Male Normal															
#154-State-Reported Violations															
1. Total Normal	.105	.104									-.056				
#156-State-Reported Accidents or Violations															
1. Female EMR	.274			-.315	-.454										
#157-Combined Accidents or Violations State- or Self-Reported															
1. Total EMR			-.121					-.128							
2. Male EMR			-.117										.150	.161	.151
3. Female EMR												-.370			
4. Total Normal											-.250		.094	.094	.094
5. Male Normal										-.138	-.241				
6. Female Normal						.156	-.190	.144	.197		-.251				

TABLE 14(continued)

Zero Order Correlation Coefficients Used in Calculating Multiple Correlation Coefficients and Partial Correlation Coefficients

Criterion Variable and Group	Predictor Variable														
	80	81	83	84	85	86	89	97	98	99	100				
#153-State-Reported Accidents															
1. Total EMR		.126								-.125	-.142				
2. Male EMR		.143								-.118	-.129				
3. Female EMR															
4. Total Normal															
5. Male Normal				.170		.150									
#154-State-Reported Violation															
1. Total Normal										-.110					
#156-State-Reported Accidents or Violations															
1. Female EMR															
#157-Combined Accidents or Violations State- or Self-Reported															
1. Total EMR		.190	.132			.140	.115			-.209	-.180				
2. Male EMR	.150	.149	.117			.131		.119	-.11	-.185	-.143				
3. Female EMR										-.300					
4. Total Normal	.094														
5. Male Normal					.127					-.141					
6. Female Normal															

TABLE 15

Beta Weights for Predictor Variables for Each Group and Criterion Variables

Criterion Variable and Group	Predictor Variable														
	6	7	8	9	11	12	13	15	16	17	19	20	21	24	27
#153-State-Reported Accidents															
1. Total EMR					-.135	-.079		-.289	-.327				-.109		
2. Male EMR					-.176								-.128		
3. Female EMR						-.101		-.130	.534		-.064				
4. Total Normal	-.013														
5. Male Normal															
#154-State-Reported Violation															
1. Total Normal	.044	-.047	-.023				.061								
#156-State-Reported Accidents Or Violations															
1. Female EMR						-.350		-.206	-.154		-.120				
#157-Combined Accidents or Violations State or Self-Reported															
1. Total EMR					-.232				.093			.026	-.075	.050	
2. Male EMR					-.211				.100				-.098		
3. Female EMR				.042	-.200										
4. Total Normal	.047									-.078					
5. Male Normal	.006									-.131					-.106
6. Female Normal					.073										

TABLE 15(continued)

Beta Weights for Predictor Variables for Each Group and Criterion Variables

Criterion Variable and Group	Predictor Variable															
	28	29	30	31	35	36	37	38	39	40	42	45	46	47	48
#153-State-Reported Accidents															
1. Total EMR						.266					.066				
2. Male EMR			.035	.080		.097									
3. Female EMR											.291				
4. Total Normal								.072				.127	.011		.073
5. Male Normal												.175	-.002		.147
#154-State-Reported Violation															
1. Total Normal		-.101				-.501	.593		.004	.090					
#156-State Reported Accidents or Violations															
1. Female EMR											-.065				
#157-Combined Accidents or Violations State or Self-Reported															
1. Total EMR															-.088
2. Male EMR					-.017										-.107
3. Female EMR													-.104		
4. Total Normal								.076					.042	.110	
5. Male Normal															
6. Female Normal	-.121														

TABLE 15(continued)

Beta Weights for Predictor Variables for Each Group and Criterion Variables

Criterion Variable and Group	Predictor Variable														
	49	50	51	68	69	70	71	72	73	74	75	76	77	78	79
#153-State-Reported Accidents															
1. Total EMR	-.106		-.207												
2. Male EMR															
3. Female EMR	-.123			.477	-.748										
4. Total Normal															
5. Male Normal											-.090				
#154-State-Reported Violation															
1. Total Normal	.131	-.209									-.176				
#156-State Reported Accidents or Violations															
1. Female EMR	.424			-.269	.224										
#157-Combined Accidents or Violation State or Self-Reported															
1. Total EMR			-.031					-.119							
2. Male EMR			-.018												
3. Female EMR													-.054	.032	.024
4. Total Normal												-.333			
5. Male Normal											-.285		-.872	-.677	.710
6. Female Normal										-.066	-.178				
						-.727	.523	.699	.724		-.250				

TABLE 15(continued)

Beta Weights for Predictor Variables for Each Group and Criterion Variables

Criterion Variable and Group	Predictor Variable										
	80	81	83	84	85	86	89	97	98	99	100
#153-State-Reported Accidents											
1. Total EMR		.094								-.140	.050
2. Male EMR		.123								-.053	-.063
3. Female EMR											
4. Total Normal											
5. Male Normal				.094		.081					
#154-State-Reported Violation											
1. Total Normal										-.088	
#156-State Reported Accidents or Violations											
1. Female EMR											
#157-Combined Accidents or Violations State or Self-Reported											
1. Total EMR		.164	-.149			.136	.067			-.057	-.131
2. Male EMR	.084	.167	-.153			.122		.013	-.089	-.089	-.082
3. Female EMR										-.243	
4. Total Normal	.934										
5. Male Normal					.087					-.112	
6. Female Normal											

TABLE 16

Summary of Results of Partial Correlation Analysis[1]

Criterion Variable and Group	√005	Number of Significant Correlations[2]	Partial Correlations		
			Number Calculated	Number Significant[2]	Number Not Significant
State Reported Accidents (153)					
1. Total EMR	.107	12	132	110	22
2. EMR Males	.113	8	56	41	15
3. EMR Females	.273	8	56	42	14
4. Total Normal	.094	6	30	20	10
5. Normal Males	.125	5	20	13	7
State Violations (154)					
6. Total Normal	.094	13	156	85	71
State Accidents or Violation (156)					
7. EMR Females	.273	8	56	41	15
Combined Criterion (157)					
8. Total EMR	.107	19	342	264	78
9. EMR Males	.113	16	240	166	74
10. EMR Females	.273	4	12	6	6
11. Total Normal	.094	8	56	24	32
12. Normal Male	.125	10	90	68	22
13. Normal Females	.138	7	42	15	27

[1]Detailed results are presented in Appendix Q, Tables Q-1, Q-13.

[2]Statistically significant at the 5% level of confidence.

100

CHAPTER V

DISCUSSION

A. REVIEW OF THE PROBLEM

One of the major factors in highway accidents is human behavior. Therefore, it is reasonable to seek measures that will improve human behavior involving the use of motor vehicles. A method of doing this is to develop a means of measuring and determining physiological and psychological variables that will serve as predictors of a person's success as a driver.

The purpose of this study was to measure and compare variables related to driving safety and to designate factors which can predict the success of EMR students in contrast to students with normal intelligence while operating motor vehicles. It was decided to compare EMRs and Normals because of the limited knowledge available on the driving behavior of EMRs in contrast to Normals.

The design for this study consisted of four groups of intellectually normal and retarded males and females ranging in chronological age from 16 to 20 years. (Reference design in Chapter III)

The method of selecting subjects consisted of a state wide quota sample. (A detailed explanation of sampling procedures and techniques is contained in Chapter III.)

In conducting the study, instruments were selected that would measure combinations of the following specific variables: visual acuity, eye-hand coordination, personality factors, perceptual organization, field of vision, reaction to stressful situations, attitude toward driving and knowledge of driving regulations. (A detailed explanation of test instruments is contained in Appendixes A through G.)

Presented in this Chapter is a detailed discussion of the findings presented in Chapter IV which include:

1. A discussion of the differences in the patterns of accidents and violations reported.
2. A discussion of the variables that are related to accidents and violations for the group.
3. A discussion of those variables that may serve as predictors of accidents and violations for EMRs and Normals, and Males and Females.
4. A discussion of related literature.

5. Summary of results.
6. Recommendations.
7. Implications for future research.

B. PATTERNS OF DRIVING BEHAVIOR

Description of Accident Violation Behavior Measures

The complexity of this study and driving behavior necessitates the use of four different criterion variables to obtain different measures of driving behavior:

1. Self-reporting of accidents, (variable 151)
2. Self-reporting of violations, (variable 152)
3. State records of accidents, (variable 153)
4. State records of violations, (variable 154)

In obtaining accident and violation data on all subjects, two methods were used:

1. At the time the subjects were tested, a card was completed, describing how many accidents and violations the subjects were involved in and a description of each.
2. The subjects driving records were then checked with their operator plate number to verify accidents and violations as recorded at the Bureau of Traffic Safety in Harrisburg. Pennsylvania.

The reasons for a detailed self-report of accidents and violations by each subject at the time of testing were:

1. State requirements specify which accidents must be reported on an official form within a five day period.
   a. Any accident involving death or bodily injury.
   b. Property damage in excess of $100.00.
   c. Accidents involving a parked car (no owner or driver present).
2. The testing of subjects covered a time span of nine months (September 1969 - May 1970).
3. The time factor involved in reporting accidents and violations to Harrisburg. A person may be arrested for a traffic violation, but depending upon factors such as charge, conviction date, court proceedings, it may not appear on a subject's driving record from one month to a year.
4. The time factor involving testing dates compared to exposure rates had to be considered. The subjects tested during September through December, 1969 were exposed to less

driving and hazardous situations than those tested from January through May, 1970.

To provide a more detailed analysis, three additional criterion variables were selected:

1. Self and state reported accidents, (variable 155)
2. Self and state reported violations, (variable 156)
3. A combination of self and state reported accidents and violations, (variable 157)
   It is felt that this combination of self and state accident/violation variables provided additional accurate criterion variables.

C. PATTERNS OF ACCIDENTS AND VIOLATIONS

Accident and Violation Reporting

The percentage of students in each group for which an accident or violation is recorded is shown in Table 9, Chapter IV. This study was designed to match the EMR and Normal groups with regard to state reported accidents. This was accomplished by requesting that school personnel refer students to the research project whom they believed to have been involved in accidents as well as those who were not in accidents. As a result, there is little difference between the percentage of Normals and EMRs in state reported accidents.

With the exception of the two criterion variables (151, self reported accidents and 155, state and self reported accidents), there is no significant difference between the total EMRs and the total Normals. Thirty-seven percent of the EMRs reported that they had accidents. The state reported only 14% of the EMRs had accidents, therefore, there is a difference in the self reporting with the state reporting for the retarded of 23%. Forty-six percent of the Normals reported that they had accidents while the state reported only 15%. There is a discrepancy of 31% between self and state reported accidents for the Normal group.

With the exception of variable 155 (self reported and state reported accidents), there were no significant differences in the percentage of EMR males with Normal males in reporting of the difference between combinations of accidents and violations. It can be observed there is a discrepancy between self and state accidents of 21% for the retarded and a 28% differential for normals. It can be assumed that basically the groups are the same on the main criterion variables (153 and 157) with no significant differences between the percentages. (Reference Table 9, page 55)

With the exception of the comparison of the female group on variables 151, 155 and 157, there are no significant differences in the percentages between the Normal and EMR female groups. On the main criterion variable 153, on which further analyses are made including multiple correlations, there are no differences between the groups. It is unclear what the differences indicate on these variables. It should be noted that the female EMR sample is quite small compared to the others and that the percentage reporting no accidents is larger than any other group. This may account for the differences among females in variables 151, 155 and 157.

Discussion of Correlates Between Accident and Violation Reporting

Presented in the following pages is a discussion of the interrelationships of the seven criterion variables.

The correlations show the extent to which self and state reported accidents and violations are related. For example, if the correlations are high, then the two methods of reporting are similar. If correlations of accidents and violations are high, then those students who tend to be involved in accidents also tend to be involved in violations. Table 17, page 87 shows the correlation matrixes for the total groups, males and females. The results for the normals are presented in the upper right hand corner of the matrix and the results for the EMRs are found in the lower left.

These correlations show modest similarity in the self and state reports for accidents and violations. The correlation of state reported accidents and violations ranged from .026 to .299 (excluding the zero correlation for EMR females); the correlations of self-reported accidents and violations are similar, ranging from -.129 to .283. These correlations indicate little commonality among accidents and violations. Thus, students who have been involved in accidents are not likely to have been involved in violations.

Examining the correlations in Table 17, page 87 of self and state reported accidents (151 and 153) show correlations ranging from .355 to .589 (Normal and EMR Females, respectively. These correlations indicate a fairly high degree of commonality in self and state reported accidents.

The results for self and state reported violations show correlations ranging from .493 to .564 (Total EMRs and Normal Males, respectively), again showing a fairly high degree of commonality in self and state reported accidents. The zero correlation for EMR Females was disregarded due to the fact that no violations were reported by the state.

The examination that follows, focuses on the extent that there are differences in the patterns of relationships for the EMRs and for the Normals. Table 18, page 88 indicates no significant differences

TABLE 17

CORRELATION MATRIX OF RELATIONSHIPS FOR VARIABLES 151 THROUGH 157

FOR TOTAL EMR WITH VARIABLES 151 THROUGH 157 FOR TOTAL NORMAL

TOTAL NORMAL GROUP
r = .094 at .05 level

	151	152	153	154	155	156	157
151		.269	.396	.121	.973	.375	.899
152	.242		.128	.562	.271	.369	.391
153	.515	.186		.099	.461	.804	.426
154	.273	.493	.292		.128	.593	.315
155	.981	.233	.557	.283		.427	.924
156	.491	.394	.763	.735	.523		.530
157	.830	.489	.472	.454	.847	.619	

TOTAL EMR GROUP
r = .107 at .05 level

TABLE 17a

CORRELATION MATRIX OF RELATIONSHIPS FOR VARIABLES 151 THROUGH 157

FOR EMR MALES WITH VARIABLES 151 THROUGH 157 FOR NORMAL MALES

NORMAL MALE GROUP
r = .125 at .05 level

	151	152	153	154	155	156	157
151		.273	.431	.100	.966	.395	.851
152	.267		.114	.564	.279	.393	.443
153	.504	.202		.026	.503	.744	.433
154	.275	.503	.299		.112	.619	.369
155	.978	.256	.531	.284		.448	.880
156	.476	.418	.744	.754	.510		.596
157	.826	.490	.465	.471	.844	.626	

EMR MALE GROUP
r = .113 at .05 level

TABLE 17b

CORRELATION MATRIX OF RELATIONSHIPS FOR VARIABLES 151 THROUGH 157

FOR EMR FEMALES WITH VARIABLES 151 THROUGH 157 FOR NORMAL FEMALE

NORMAL FEMALE GROUP
r = .138 at .05 level

	151	152	153	154	155	156	157
151		.283	.355	.179	.980	.368	.960
152	-.129		.129	.523	.277	.268	.309
153	.589	-.076		.239	.408	.915	.400
154	.000	.000	.000		.174	.506	.221
155	1.000	-.129	.589	.000		.417	.980
156	.589	-.076	1.000	.000	.589		.437
157	.843	.425	.496	.000	.843	.496	

EMR FEMALE GROUP
r = .273 at .05 level

TABLE 18

SIGNIFICANT DIFFERENCE AMONG CORRELATION

COEFFICIENTS FOR NORMAL AND E.M.R. STUDENTS

FOR CRITERION VARIABLES 151 THROUGH 157

(SELF AND STATE ACCIDENTS AND VIOLATIONS)

CRITERION VARIABLES	EMR CORR.	NORM. CORR.	Z	SIGN.	EMR CORR.	NORM. CORR.	Z	SIGN.	EMR CORR.	NORM. CORR.	Z	SIGN.
151-152	.242	.269	.416	n.s.	.267	.273	.114	n.s.	.129	.283	1.010	n.s.
151-153	.515	.396	.208	n.s.	.504	.431	1.150	n.s.	.589	.355	1.960	.05
151-154	.273	.121	2.220	.05	.275	.100	1.954	n.s.	.000	.179	1.140	n.s.
152-153	.186	.128	.972	n.s.	.202	.114	1.150	n.s.	.076	.129	.310	n.s.
152-154	.493	.562	1.388	n.s.	.503	.564	.689	n.s.	.000	.523	3.670	.01
153-154	.292	.099	2.800	.01	.299	.026	3.100	.01	.000	.239	1.520	n.s.
151-155	.981	.973	2.500	.01	.978	.966	.000	n.s.	1.000	.980	1.700	n.s.
151-156	.491	.375	1.666	n.s.	.476	.395	1.150	n.s.	.589	.368	1.835	n.s.
151-157	.830	.899	3.988	.01	.826	.851	.919	n.s.	.843	.960	4.550	.01
152-155	.233	.271	.555	n.s.	.256	.279	.344	n.s.	.129	.277	1.010	n.s.
152-156	.394	.369	.416	n.s.	.418	.393	.230	n.s.	.076	.268	1.265	n.s.
152-157	.489	.391	1.666	n.s.	.490	.443	.689	n.s.	.425	.309	.823	n.s.
153-155	.557	.461	1.805	n.s.	.551	.503	.804	n.s.	.589	.408	1.580	n.s.
153-156	.763	.804	1.524	n.s.	.744	.744	.000	n.s.	1.000	.915	21.770	.01
153-157	.472	.426	.692	n.s.	.465	.443	4.942	.01	.496	.400	.760	n.s.
154-155	.283	.128	2.220	.05	.284	.112	1.954	n.s.	.000	.174	1.140	n.s.
154-156	.735	.598	3.470	.01	.754	.619	2.990	.01	.000	.506	3.544	.01
154-157	.454	.315	2.220	.05	.471	.369	1.370	n.s.	.000	.221	1.455	n.s.
155-156	.523	.427	1.666	n.s.	.510	.448	.919	n.s.	.589	.417	1.455	n.s.
155-157	.847	.925	5.277	.01	.844	.880	1.600	n.s.	.843	.980	6.772	.01
156-157	.619	.530	1.805	n.s.	.626	.590	.574	n.s.	.496	.437	1442	n.s.

Z transformation method was used for calculating significance of differences. (Walker and Lev - 1958)

Z needed at .05 level for significance = 1.96

Z needed at .01 level for significance = 2.57

in correlations for the EMRs and Normals for variables 151 and 152 (self reported accidents and self reported violations); and for variables 152 and 153 (self reported violations and state reported accidents). There was a significant difference for the female EMR with variables 151 and 153 (self and state reported accidents). This indicates that the retarded females more often reported accidents in a manner consistent with the state records. There is a significant difference in the correlations for the total and male EMR group for variables 153 and 154 (state reported accidents and violations). This indicates that to a moderate degree, EMR students who tend to have state reported accidents also tend to have state reported violations. This is not the case for the Normal group. An examination of the differences in correlations for variables 155 through 157 shows some significant differences in correlation patterns, but generally supports the conclusion of the similarity of EMRs and Normals in accident and violation reporting.

D. DISCUSSION OF INDEPENDENT VARIABLES WITH CRITERION VARIABLES

DEMOGRAPHIC COMPARISON

Chronological Age (Variable 6)

The Normals tested were younger than the EMR groups. For the EMR groups, accidents appeared to be distributed in equal proportion in all ages. For the total normal group and male normal group, the older the subjects were, the more likely an accident or violation was reported by both self and state. For the total normal group, there was a negative correlation between age and criterion variables 152 through 157. For the male normal group, there was a negative correlation between age and criterion variables 152, 154, 156, and 157. Although age was included in three out of four multiple correlations, the beta weights (variable 152, -.013, variable 154, .044, variable 157, .047) show that age ranks low as a predictor of accidents and violations.

Age was not an independent predictor for criterion variable 153, when the other variables were controlled by partial correlation methods. (Reference Appendix Q-4) The partial correlation for the total normal group for age and criterion variable 153 was based on relationships with Wilson variables 38, 45, 46 and 48 and driving experience (variable 75).

For the total normal group and criterion variables 154 and 157, the partial correlations revealed that age was significant when all other variables were controlled. For the male normal group, age remained significant when all of the variables were controlled. (Reference Appendix Q-12)

These results are consistent with the findings of the National Education Association Research Division which states, "that while

teenagers have more than the normal number of accidents, the involvement is not as great as the people aged 20-24", and of the results reported in the Travelers 1970 Book of Street, Highway and Interstate Accident Facts, (Table 4, page 8) which reveals that drivers under 18 years of age have considerably lower involvement in fatal and non-fatal accidents than those over 18 years of age.

Height (Variable 7)

The height of the subjects tested did not make any difference in the number of accidents or violations reported for the EMR groups. But for the Normals tested with accidents, height was related to the following criterion variables: self reported violations (152), state reported violations (154), and accidents or violations--state reported (156). The relationship was negative, indicating that the taller the subjects, the more they were involved in violations, reported by self, state, and a combination of both.

However, in the partial correlations for the total normal group and criterion variable 154, height became insignificant when the other variables were controlled, with the exception of variables 29 and 99. (Reference Appendix Q-6)

Weight (Variable 8)

The EMRs tested weighed an average of seven pounds more than the normals. For the total normal group, heaviness was related to criterion variables 152 and 154. Therefore, the heavier the normal subjects were, the greater the number of self and state reported violations. However, the partial correlations revealed that for the total normal group and criterion variable 154, weight was not an independent predictor of accidents. When the other variables were held constant, weight became insignificant for all except variable 29. (Reference Appendix Q-6) For the female EMR group, heaviness was related to criterion variables 151 and 155. Again, the heavier the EMR females, the more self-reported accidents (variable 151) and the combination of self and state reported accidents (variable 155).

Wearing of Glasses (Variable 9)

It was found that ten percent more of the total Normal group wore glasses than the total EMR group. Almost half of the females tested in both groups wore glasses. No relationship between the wearing of glasses and the accident-violation criterion variables was found with the exception of female EMRs to the combined criterion variable 157. The correlation for female EMRs was negative, indicating that those EMRs who wore glasses were most likely to be accident free. Also, the partial correlation revealed that for the female EMR group

and criterion variable 157, that the wearing of glasses was interrelated to the other variables, supporting the conclusion that the wearing of glasses was not related in any important way to accidents and violations. (Reference Appendix Q-10)

Handedness (Variable 10)

The majority of subjects tested were right handed (84% of the Normal and 86% of EMR). No relationship between handedness and any of the accident violation criterion variables (151-157) was found in this study. Therefore, it need be of little concern to a teacher of Driver Education whether a student be right or left handed.

Class in School (Variable 11)

The Normal subjects average higher in grade in school, but younger in chronological age than the EMRs. Therefore, the EMRs in any class have been driving for a longer period of time. There was a negative correlation between variable 11 and all criterion variables (151 through 157) for the total EMR and male EMR groups. Also, the multiple correlation revealed a beta weight of -.135 with criterion variable 153. Class in school ranked high as a predictor of accidents. This further substantiates the results of the zero order correlations that the higher the grade in school for the EMR, the more likely they are to have accidents. The partial correlation reveals that class in school is an independent predictor of accidents.

The multiple correlation for the male EMR group showed a beta weight of -.176 with criterion variable 153 and a -.211 with criterion variable 157. This variable ranked as the highest predictor of accidents for the male EMR group. Also, there were significant negative correlations for the total EMR group and the EMR males with all criterion variables. There was a significant negative correlation with criterion variable 151 and 157 for the EMR females. There was no significant correlation for the total normal group and the female normal group. However, there was a significant negative correlation with criterion variables 151, 154, 155, and 156 for the normal male group.

In an effort to find an adequate explanation for this correlation, it was hypothesized that this relationship may have been due to greater length in driving time and more exposure to traffic situations. To check this possibility, the partial correlations of class with age, driving experience in months, and miles driven per year were checked to determine if controlling for these variables accounted for the correlation. Class in school remained an independent predictor of accident/violation behavior. Examination of the data showed that age, driving experience, and miles driven per year did not reduce the correlations.

Residence (Variables 14 through 18)

When examining the residence variables, it was found that a significantly greater number of normal students lived in cities, towns and suburbs. The EMRs came primarily from rural and farm areas.

Residence (living in suburbs or cities), for total EMR groups and female EMR groups, was correlated with criterion variables 153 (state reported accidents) and 156 (self and state reported violations). This was a significant negative correlation, indicating that the EMRs who lived in the cities and suburbs were more likely to have accidents and violations. The partial correlation revealed that for the female EMR group and criterion variable 156, that when other variables were controlled, residence remained significant. (Reference Appendix Q-7) Residence for male EMRs was correlated with criterion variable 154 (state reported violations). This was a significant negative correlation indicating that living in the cities and suburbs for male EMRs was related to having violations.

For total EMR groups, living in all areas with the exception of suburbs was related to criterion variables 151, 153, 155, and 157. The multiple correlation revealed a beta weight of -.327 for the total EMR group with criterion variable 153. This variable ranked as the number one predictor of accidents for the total EMR group. In the partial correlation, residence (variable 16) dropped out as being significantly related when variables 36, 49, 51, 81, 99, and 100 were held constant. Looking at the nature of these variables, (Wilson Recognition of Simple and Complex Detail Tests and Reaction Time Tests on the Driving Simulator) leads to the conclusion that these differences can be attributed to psycho-motor and coordination differences among those subjects living in urban, as compared to non-urban locations.

The partial correlation for the male EMR group and criterion variable 157 showed residence (variable 16) to be an independent variable. (Reference Appendix Q-9) Residence (variable 16), for the total and male EMR group and criterion variable 157, remained independent in every correlation.

Male normals living in the cities were less likely to have accidents than those living in all other areas (criterion variables 154-157). But for male normals living in all areas other than cities, the multiple correlation revealed a beta weight of -.131 with criterion variable 157. Residence (variable 17) proved to be a good predictor of accidents for the normal male. The partial correlation, for the total normal group and criterion variable 157, revealed that residence (variable 17) was an independent variable. Residence remained significant when the other variables were controlled.

(Reference Appendix Q-11) Residence (variable 17) for the male normal group and criterion variable 157 remained independent when other variables were controlled. Male normals living in all areas, with the exception of suburbs, were related to criterion variables 151 and 157.

The multiple correlation, for the female EMR group residing on farms, rural areas, towns and cities (variable 16), had a beta weight of .534 with criterion variable 153 and a beta weight of .154 with criterion variable 156. The residence variable ranked high in the prediction of accidents for the female EMR.

The partial correlation, for the female EMR group and criterion variable 153, indicated that when variables 19, 42, 49, 68, and 69 were controlled, residence variables 15 and 16 remained high predictors. (Residence did influence the results on the Wilson variables 42 and 49 and Pennsylvania Manual scores for this group.)

It was hypothesized that accident susceptibility as related to residence may be explained by socio-economic factors. When father's occupation, a measure of socio-economic status, is held constant, residence still remains independent. (Reference Appendix Q-3)

The results of this study verify the findings of Finesilver, (1962), and Gutshall, Harper, and Burke, (1968), in their studies on residence for EMRs.

Father's Occupation (Variable 19)

In general, normal students compared with EMR students appear to come from higher socio-economic backgrounds as revealed by father's occupation. With the exception of female EMRs, there were no significant correlations between father's occupation and the accident violation criterion variables.

Comparing fathers' occupation to groups and criterion variables revealed that EMR females whose fathers were in skilled or professional occupations were more likely to have had accidents. An example is the negative correlation with criterion variables 151, 153, 155, and 156, while the EMR females who came from homes where the father was in an unskilled occupation, tended to have fewer accidents.

The partial correlation reveals that for the female EMR group and criterion variable 156 that father's occupation is an independent predictor of accidents when other variables are controlled. (Reference Appendix Q-3 and Q-7) However, the multiple correlation showed that the beta weights for this group rank low and therefore, father's occupation cannot be used as a strong predictor of accidents.

There was a negative relationship for normal girls coming from homes with skilled fathers to criterion variable 152 (self reported violations). This indicates that normal girls with skilled fathers had more self reported violations.

DRIVER EVALUATOR

Visual Acuity (Variables 20, 21 and 22)

With the exception of the females, there were no significant differences on visual acuity scores. These results are consistent with those of Egan (1967, p. 323) who reports that on visual acuity and sight vision tests, both EMR and Normal groups scored equally well.

Visual acuity in the left eye was related for the total EMR group to the combined criterion variable 157. Surprisingly, this relationship was negative indicating the higher the acuity score in the left eye, for the total EMR group, the more combined accidents and violations reported (variable 157). Visual acuity for the left eye was related to self-reported violations for the male normal. For the male normal group, the higher the acuity score in the left eye, the more self-reported violations (variable 152).

The multiple correlation for acuity in the left eye revealed low beta weights.

Visual acuity in the right eye showed a negative relationship to the total EMR and male EMR groups. Again, the higher the acuity score the greater the involvement in accidents. Also, the multiple correlation showed a beta weight of -.128 with criterion variable 153 and -.098 with criterion variable 157. For the male EMR group, acuity in the right eye is a fair predictor of accidents. For the total EMR group and criterion variable 153, visual acuity in the right eye (variable 21) remained significant when the other variables were controlled. The partial correlation revealed acuity to be an independent measure with criterion variable 153. (Reference Appendix Q-1) Also, visual acuity (variable 21) was an independent predictor for the male EMR and criterion variable 153. When the other variables were controlled, variable 21 still remained significant. (Reference Appendix Q-2)

Visual acuity in the right eye (variable 21) for the male EMR group and criterion variable 157, did not remain significant when other variables were controlled. (Reference Appendix Q-9)

In the partial correlation for the total EMR group and criterion variable 157, visual acuity in the right and left eyes (variables 20 and 21) became insignificant when other variables were controlled. Therefore, these two variables are inter-related to other variables in the correlation matrix. (Reference Appendix Q-8)

The combined acuity scores showed a negative relationship with self-reported violations (variable 152) for the male normal group. This study reveals that the higher the acuity score in both eyes combined for male normals, the more self-reported violations. Goldstein (1963, page 2) found that visual acuity did not relate to accident involvement. In contrast, this study reveals unusual results on acuity scores. The higher the acuity scores for some groups, the more accidents and violations reported; whereas, there was no relationship shown for other groups.

Depth Judgement (Variable 23, 24 and 25)

In the Depth Judgement Test, scores for the total EMR group were significantly related with the combined criteria variable 157. This was a positive correlation; therefore, the higher the score on judging distance (nearness) on cars close to the subject, the less chance of his being involved in accidents or violations. There was no relationship between judging distance (nearness) and accidents for the other groups. In the partial correlation for the total EMR group and criterion variable 157, depth judgement nearness (variable 24) was inter-related with other variables. In ten of 17 correlations, variable 24 dropped below the significance level. But in five out of six correlations with the stress variables (81, 83, 86, 89, 99 and 100), variable 24 remained significant. Therefore, it can be assumed that these stress variables measure something different than that measured by variable 24. (Reference Appendix Q-8) The Depth Judgement for cars at a distance (farness) did not correlate with any of the accident violation criterion for any of the groups. This means, that for the EMR groups, the more accurate they are in the perceiving a situation which is close to them, the more likely they are to react correctly and avoid accident situations.

The mean scores for depth judgement showed no significant difference between the EMR and Normal groups on the ability to judge distance. These findings are not completely consistent with a similar report by Egan (1967, p. 323) who, in comparing EMRs and Normals, reports that depth judgement tests indicate a deficiency in the EMR's ability to gauge distance between automobiles.

Color Vision (Variable 26)

Color vision showed no relationship to any of the criterion variables for any of the groups. Very few subjects in this study had a deficiency in the ability to distinguish color, accounting for the lack of relationships for this variable. Egan (1967, p. 323) reported the same results in his study.

Field of Vision (Variables 27, 28 and 29)

Field of vision for the left eye for male normals was related to criterion variables 152, 154, 156 and 157. Surprisingly, the nature of the relationship was a negative one, indicating the better the peripheral vision in the left eye for normal males, the more likely they are to have reported some type of accident or violation.

The partial correlation revealed that for the normal male and criterion variable 157, field of vision in the left eye appears to be an independent variable. When the other variables are controlled, variable 27 was insignificant in three of nine correlations. (Reference Appendix Q-12)

Field of vision in the right eye for normal females was related to criterion variables 151, 155 and 157. The relationship was negative, indicating the better the peripheral vision in the right eye, the more self reported accidents, and combinations of self and state reported accidents. The multiple correlation revealed a beta weight of -.121 with criterion variable 157, indicating that field of vision scores are a fair predictor of accidents for female normals.

Field of vision in the right eye for the total EMR group was related to criterion variable 154 (state reported violations). The relationship was negative, indicating the higher the score on peripheral vision in the right eye, the more state violations.

Total scores, on the field of vision test, showed the female EMRs scored lower than any of the other groups. This indicates a deficiency in vision for this group and shows a definite need for specialized training. This weakness, commonly called tunnel vision, is habitual. It may be corrected through special training and practice, so that the subject will compensate for this weakness when driving.

Total field of vision scores for total and male normal groups was related to criterion variable 154. This relationship was negative indicating the higher the total field of vision score, the more state reported violations. However, the partial correlation

for the total normal group and criterion variable 154 revealed that total field of vision is an independent predictor. Variable 29 remained significant in all correlations except when height and age were controlled. (Reference Appendix Q-6) The authors have no logical explanation for the negative relationship in the field of vision test.

SUMMARY OF FINDINGS FOR DRIVER EVALUATOR

Overall, the findings for the driver evaluator (Field of Vision and Visual Acuity Tests) are surprising. The higher the acuity and field of vision scores, the more likely accidents and violations were reported.

However, the depth judgement correlations were in the expected direction. The higher the scores on judging distance, the less chances of having accidents and violations reported.

EMRs when compared to normals were deficient in the field of vision test. Also, the female EMRs were deficient in the visual acuity tests.

In any case, it may be that those subjects with visual limitations were compensating for them while driving, such as constantly moving the eyes or looking more in the direction of the weak eye, while those without visual deficiencies may tend to be more easily distracted.

These findings are not completely consistent with those of other investigators. Egan (1967, p. 324) reports that peripheral vision defects are no more of a problem for the EMR student than for the normal student.

The negative correlations found in the Driver Evaluator Tests are particularly difficult to explain. For practical purposes, as screening devices for drivers, the depth judgement test appears to be more useful for predicting accident or violation susceptibility.

Wilson Test of Driver Selection (Variables 30 through 51)

Wilson Test I, Visual Attention (Variables 30-32), showed that the EMR females had less complete, less correct, and less percent correct than any other group.

Wilson Test II, Depth Visualization (Variables 32-35), showed that the total EMRs, EMR males, and EMR females had less complete

than the normal groups. Also, the percent correct was greater for the normal groups. The EMR females scored lower on the number and percent correct than any other group.

Wilson Test III, Recognition of Simple Detail (Variable 36-38), showed that the normal groups completed more of the test items and had more items correct than the EMR groups. However, there was not more than a one percent difference on percent correct between the total group scores.

Wilson Test IV, Recognition of Complex Detail (Variable 39-41), showed that the normal groups had a greater number complete and a greater number correct than the EMR groups. Also, the normal groups had a greater percent correct than the EMR groups.

Wilson Test V, Eye-Hand Coordination (Variable 42-44), showed that the normal groups had a greater number complete, correct, and percent correct.

Wilson Test VI, Steadiness (Variable 45-47), showed that the normal groups had a greater number complete, correct, and a greater percent correct.

The normal groups completed more items on most of the Wilson Sub-Tests than the EMR groups. If the normals had high scores, they had fewer accidents. The normals who passed more of the total battery of the Wilson Test had fewer accidents and violations. Also, the multiple correlation for the male normal group revealed that variable 45 (Wilson Test 6 - Steadiness) had a beta weight of .175 on criterion variable 153. Variable 48 (Number of Wilson Tests Passed) had a beta weight of .147 with criterion variable 153. Variable 47 (Wilson Test 6 - Steadiness - Percent Correct) had a beta weight .042 with criterion variable 153. The Wilson Test ranked as a high predictor of accidents for the normal male group.

The partial correlation revealed that for the total normal group and criterion variable 153, Wilson Test variables 38, 45, 46, and 48 are independent predictors. (Reference Appendix Q-4)

Also, the Wilson variables 45, 46, and 48, for the normal male group and criterion variable 153, were independent variables. (Reference Appendix Q-5)

The partial correlation for the normal males and criterion variable 157 shows that the Wilson variables (38, 46, and 47) to be independent variables. (Reference Appendix Q-12)

The partial correlation for the total normal group and criterion 154, revealed that Wilson variables (36, 37, 39, 40 and 49) are all independent predictors when other variables are controlled (96% of the inter-correlations between variables 36 and 49 continued to remain significant when the other variables were controlled). However, Wilson (variable 50) was inter-related to the other variables for this group.

If the scores were high on the Wilson, for the EMR total and male group in contrast to the normal group, they had accidents and violations. (Variables 151, 152, 153, 154, 155, and 157)

Also, the multiple correlation on number of Wilson Tests passed (variable 48) revealed a beta weight of -.107 with criterion variable 157. The number of tests passed on the Wilson for the male EMR group proved to be a high predictor of accidents.

The partial correlation indicated that for the total EMR group and criterion variable 153 Wilson variables 36, 42, 49, and 51 were independent variables. When variables 11, 12, 15, 21, 81, 99, and 100 were partialled out, the Wilson variables remained significant. (Reference Appendix Q-1)

The partial correlation for the male EMR group and criterion variable 153 revealed that Wilson variables 31 and 36 and Stress Test variables 81, 99, and 100 are inter-related and not necessarily an independent measure for the male EMR group. The only time the Wilson Test remained independent is when class in school or acuity were controlled. One out of nine variables dropped out when the Wilson was controlled and five out of nine become insignificant when the Stress Test scores were controlled. (Reference Appendix Q-2)

The partial correlation for the female EMR group and criterion variable 156 revealed that Wilson variables 42 and 49 were independent predictors when other variables were controlled. (Reference Appendix Q-7)

The partial correlation for the male EMR group and criterion variable 157 revealed that Wilson variable 48 was an independent variable. Wilson variable 51 was inter-related to other variables for this group. (Reference Appendix Q-9)

The partial correlation for the total EMR group and criterion variable 157 revealed that Wilson variables 35, 48, and 51 are independent variables for this group. In 45 correlations, when other variables were controlled, only seven dropped below significance level. (Reference Appendix Q-8)

The total number completed in the six Wilson Sub-Test (variable 49), for the female EMR group, was important in the multiple correlation. There was a beta weight of -.123 with criterion variable 153 and a beta weight of .424 with criterion variable 156 for this group. The number complete of the Wilson Sub-Tests proved to be a good predictor of accidents for female EMRs.

Discussion of Wilson Tests

The normals had significantly more correct, more complete, and a greater percentage correct on the Wilson Tests than the EMRs indicating that the test revealed a difference due to the nature of the tasks, motor skill development, coordination of fine muscles, perceptual speed, and the ability to judge spacial relationships.

There were some surprising findings for the correlations. All correlations were in the expected direction for the normal students. High scores on the Wilson Sub-Tests were associated with not having accidents or violations.

In contrast, a number of the Wilson Test scores were correlated in a direction that normally would not be expected for the EMRs. These tests included Visual Attention, Depth Visualization, Recognition of Complex Detail, Total Number of Tests Passed, and The Percent Correct Variables. Only variables 36 and 42 correlated in the expected direction with state reported accidents (variable 153). This indicates that EMRs who had good recognition of simple detail and eye-hand coordination were less likely to have accidents.

Recognition of Simple Detail (variable 37) was significantly correlated for the total normal group. Also, the multiple correlations revealed a beta weight of .593 with criterion variable 154. The multiple correlation on variable 36 showed a beta weight of -.501 with criterion variable 154. Wilson Test 3 was a good predictor of violations for the normal students.

Overall, the Tests appear to be useful predictors of accident susceptibility for the normal students. Those with better perceptual and psycho-motor skills were less susceptible to accidents and violations. The results for the EMR students were conflicting, in that high scores on certain tests were associated with accident and violation susceptibility, while high scores on other tests were associated with non-accident and violation involvement.

Sixteen Personality Factor Questionnaire (Variables 52 through 67)

The factors on the 16 P. F. did not significantly correlate with any of the accident violation criterion variables. This may be explained in part because there was only a range of eight for each of the sixteen sub-test factors. Also, Form E of the 16 P. F. Test was an experimental test. It should also be pointed out that Form E of the 16 P. F. was used because of the reading level of EMR students. Perhaps the factors measured on the 16 P. F. have no influence on driving performance. The authors of this study are unable to explain the lack of correlation on the 16 P. F. Factors with the accident violation criterion variables.

In comparing the means on variables 52 through 56, the normals has significantly higher scores than the EMRs for AFFECTOLHYMIA (variable 52), or outgoing traits; SURGENCY (variable 56), or happy-go-lucky; and PRASMIC (variable 59), or tender minded. Therefore, the 16 P. F. Test only revealed differences in personalities between EMRs and Normals in this study and did not predict accidents. Other studies as reported by Stratemeyer (1964, p. 17), in a review of accident research, show that personality factors do have a relationship to accidents. Accident repeaters are described as inclined to be impulsive and unsteady emotionally, egocentric, boastful, aggressive, excessively active, and adventuresome. Beamish and Malfetti (1962, p. 13) reported that violator groups rate lower on emotional stability, conformity, objectivity, and mood; and higher on psychopathic deviation, impulsivity, and ascendancy.

Pelz (1968, p. 14) discussing a factor analysis of six major accident causes, demonstrates two factors, rashness and inattention, as being related to accidents. "In all likelihood, the motivations underlying rash or reckless driving accidents will be found to include aggressive or rebellious motivations."

Kraus, Steele, Ghent and Thompson (1970, p. 55) in reporting on the pre-driving identification of drivers, cite studies that have found that drivers involved in, or responsible for accidents, differ from matched accident free drivers in certain psychosocial traits such as aggressiveness, intolerance of authority, non-conformity, and irresponsibility. But the two groups of drivers do not differ significantly in physiologic traits such as visual acuity or reaction time.

Pennsylvania Manual Test (Variable 68)

In examining the Pennsylvania Manual Test, (a twenty-five question exam developed with a fifth and sixth grade reading level) there were no significant correlations with involvement in accidents for the total groups. However, the normal group did score significantly higher on the manual test, demonstrating a more thorough understanding of Pennsylvania driving regulations or a better reading comprehension. This corresponds with Egan (1969, p. 323) who reported that normal students possess a better understanding of the vehicle code.

The only relationship on this test was for EMR females with the criterion variables 153 and 156. EMR females who had higher scores on the Pennsylvania Manual Test had more state reported accidents (variable 153) and self and state reported violations (variable 156). The multiple correlation revealed a beta weight of .477 with criterion variable 153 and a beta weight of -.269 with criterion variable 156. The partial correlation revealed that for

the female EMR group and criterion 156, when the Pennsylvania Manual variable was controlled, it remained significant with all other variables in comparison. (Reference Appendix Q-7)

The Pennsylvania Manual Test does not appear useful as a predictor of accidents for any of the groups with the exception of the female EMRs. The authors of this study are unable to explain the negative correlation for this group.

Siebrecht Attitude Scale (Variable 69)

An examination of the Siebrecht Attitude Scale reveals a relationship between female EMRs and criterion variables 151, 153, 155, and 156. It was a negative relationship indicating that higher scores for female EMRs were related to greater involvement in accidents.

Also, the multiple correlation revealed a beta weight of -.748 with criterion variable 153 and a beta weight of .224 with criterion variable 156. The Siebrecht Attitude Scale ranked as the number one predictor of accidents for the female EMR group. The partial correlation revealed that for the female EMR group and criterion 156, the Siebrecht remained an independent predictor when the other variables were controlled individually. The Siebrecht stands out as an independent predictor of violations for the female EMR group. (Reference Appendix Q-7)

There was a relationship between the total normal group and self reporting accidents (variable 151). The higher the score on Siebrecht, the more accidents they reported. The Siebrecht Attitude Scale reveals that the normals had significantly higher scores than the EMRs. Perhaps the reason the normals did better on this scale is because it is based on the ability to comprehend the reading and project driving attitudes.

The self rating expertness scale on the back of the Siebrecht Attitude Scale is only related to one criterion group, normal total versus state reported accidents and violations. Those normals who rated themselves higher in terms of driving ability on the self rating scale (variable 150) had higher accident rates. These findings may be attributed to a false sense of security many normal students have about driving. The better they think they are as drivers, in terms of attitude, knowledge of driving, experience, and understanding of law, the higher the involvement in accidents.

In contrast to this study, Brazell (1962, p. 24) found that students who received low scores in attitudes scales tend to have more moving traffic violations and more accidents than those students who have high attitude scores.

Pelz (1968, p. 14) found no relationship between attitude inventories and accident involvement and concluded that attitude inventories do not appear useful in the improvement of driving.

Driver Education (Variables 70 through 73)

Concerning the differences in participating in Driver Education programs between the normals and retarded on the four variables (70 through 73) and combinations of behind the wheel and classroom instruction, significantly more normals (74%) had Driver Education than the EMRs (59%).

In only one instance of comparisons between Driver Education and the criterion variables can accidents be predicted. Total EMRs having no Driver Education or classroom instruction only, (variable 72) were more likely to have accidents or violations. The partial correlation for the total EMR group and criterion variable 157 showed that Driver Education (variable 72) is an independent predictor. In seventeen partial correlation comparisons, it became insignificant only four times. This is an important finding in as much as other studies have questioned the value of Driver Education. The analysis in this study was unique, in that it provided a means for controlling other factors. The variables included in the partial correlation were: class in school, residence, driver evaluator scores, Wilson scores, binary checks on simulator tests, and combinations of steering and braking reaction time. Irrespective of all these variables, Driver Education by itself made a significant difference for the number of accidents and violations for the total EMRs.

The female normals who had Driver Education reported more accidents and violations as can be seen in the correlations with criterion variables 155 and 157. In the multiple correlations, variable 70 had a beta weight of -.727 with criterion variable 157 for the female normal group; variable 73 had a beta weight of .724 with criterion variable 157; variable 72 had a beta weight of .699 with criterion variable 157; and variable 71 had a beta weight of -.250 with criterion variable 157. In all cases where normal adolescent girls were exposed to Driver Education, by either classroom instruction, behind the wheel instruction, or combination of both, more accidents and violations were reported. (Reference Appendix Q-13)

A small percentage of EMRs than Normals had Driver Education in this study. The fact that a lack of Driver Education is an indicator of accident susceptibility, is a significant finding for this group.

Miles driven per year (Variable 74)

There appears to be no relationship to miles driven and criterion variables for either of the total groups. There is a

negative relationship between male normals and criterion variables 155 and 157. The more miles the normal males drove, the more they were involved in accidents. Variable 74 appears to be an independent variable for the male normal group and criterion variable 157. It became insignificant in three out of the nine correlations. It may be inter-related to restrictions, residence, and age. (Reference Appendix Q-12)

There appears to be no difference in the number of miles driven between groups for the subjects tested in this study. Similar findings were reported by Gutshall, Harper, and Burke (1968).

Driving Experience in Months (Variable 75)

It was found that the EMR group has been driving an average of one year longer than the Normal group; therefore, they have had more exposure to traffic situations and a greater chance of being involved in accidents. But there was no relationship between the EMR driving experience and accident violation criterions. There is a negative correlation between driving experience and all of the criterion variables for the normal groups (total and male); indicating that the longer they drive, the more likely an accident or violation will be reported. The partial correlation revealed that for the total normal group and criterion variable 153 driving experience is an independent predictor, when other variables are controlled. (Reference Appendix Q-4) However, for criterion variable 157, driving experience remained related to the criterion variable, when the other variables were controlled, but completely dropped out when it was controlled. (Reference Appendix Q-11)

The multiple correlation for the female normal group revealed a beta weight of -.250 with criterion variable 157. Driving experience is an independent variable for the female normal group and criterion 157. It remained significant when all other variables were controlled. (Reference Appendix Q-13)

Driving experience held up as an independent variable for the male normal group and criterion variable 157. When it was controlled against the other variables, it became insignificant in five of the nine correlations. (Reference Appendix Q-12) Driving experience in months was an independent variable for the total normal group and criterion variable 154. It remained significant when other variables were controlled. (Reference Appendix Q-6)

Also, the multiple correlation for the male normal group revealed a beta weight of -.178 with criterion variable 157. This indicates that the longer the normal groups have been driving, the more likely they are to have had accidents. In a shorter period of

time, normal students are having more accidents and violations than the EMR students who have been driving longer and exposed to traffic situations longer.

Driving Restrictions (Variable 76)

A greater number of normals had driving restrictions on their operator's license than EMRs. However, in the multiple correlations, variable 76 had a beta weight of -.133 with criterion variable 157 for the female EMR group. If the female EMRs had driving license restrictions, they are more likely to have had reported accidents and violations.

The partial correlation revealed for the female EMR group and criterion 157 that driving restrictions dropped out in three of the six correlations. Driving restrictions appeared to be related to the other variables (9, 11, and 99) and not an independent predictor variable for this group. (Reference Appendix Q-10) However, driving restrictions did appear to be independent of the Stress Test variable 99.

STRESS TEST (DRIVING SIMULATOR TEST WHICH INCLUDES THE MEASUREMENT OF REACTION TIME TO EMERGENCY DRIVING SITUATIONS)

Total Errors Count For Braking, Steering, Signals, and Speed (Variables 77 through 80)

There were no significant differences in mean scores on the binary checks for the total normals and the total EMRs or between the sexes for each group for the variables 77 through 80 which were braking, steering, signal and speed. These findings support research conducted by Kahn (1955) who states that the manual dexterity for EMRs was not noticeably different from that of the other normal students. He implied that while some mentally retarded students were very poor in handling a car, the number of such students was no greater proportionately than the average. However, Williams and Little (1966) found that in instances of necessary coordinated hand and foot manipulations, it seemed difficult for the special class students to synchronize these movements.

There was a positive relationship between variables 77 through 80 with criterion variable 157 for the total normal group. Also, the multiple correlations revealed high beta weights for this group. (Total braking errors, a beta weight of -.872; total steering errors, a beta weight of -.677; total signal errors, a beta weight of .710;

and total speed errors, a beta weight of .934). However, the partial correlation for the total normal group and criterion variable 157, revealed that variables 77 and 80 were not independent predictors of accidents. (Reference, Appendix Q-11)

There was a positive correlation for variables 77 through 80 with criterion variables 151, 155 and 157, for the total EMR group. The partial correlation for these variables with criterion variable 157, showed that total braking, steering, signals, and speed errors were independent predictors. When 64 variables were held constant, the binary variable still remained significant. However, when the binary variables were inter-related with each other, they became insignificant. (Reference, Appendix Q-8)

There was a positive correlation for variables 77 through 80 with criterion variables 151, 155 and 157 for EMR males. Also, for this group and criterion variable 157, variables 77, 78 and 79 proved to be independent predictors, when other variables were controlled in partial correlation. (Reference, Appendix Q-9)

The total braking, steering, signals, and speed errors were good predictors of accidents and violation involvement. The more braking, steering, signals, and speed errors the total normal group and total and male EMR groups made while driving the driving simulator, the more likely their not being involved in accidents or violations.

Reaction Time-Braking (Summary of Reaction Time to Five Immediate Emergency Situations (Variable 81)

The normals reacted faster than the EMRs on reaction time to the immediate emergency situations. There was no relationship for normals' reaction time on this variable. There was a positive relationship to all criterion variables for the EMR total and male EMR group. The faster their reactions, the more accidents and violations they reported. The multiple correlation, for the male EMR group, revealed a beta weight of -.123, with criterion variable 153 and .168 with criterion variable 157.

The partial correlation for the total EMR group revealed that this Stress Test variable is an independent predictor of accidents. Variable 81 remained significantly correlated with criterion 153 when the other variables were controlled. (Reference Appendix Q-1). Also, for the male EMR group and criterion variable 157, variable 81 (Reaction to immediate situations) was independent when other variables were controlled. (Reference Appendix Q-9) Also, for the total EMR

group and criterion variable 157, reaction time to immediate situations (variable 81) is an independent predictor. (Reference Appendix Q-8)

Therefore, reaction time to immediate emergency situations on the simulator stress test proved to be a predictor of accidents for the total and male EMR group.

Reaction Time-Braking (Summary of Reaction Time to Five Apparent Emergency Situations) (Variable 82)

The EMR groups reacted slower than the normal groups on reaction time to the apparent emergency situations. No relationship was indicated for either group for variable (82) with the accident violation criterion variables.

Reaction Time-Braking (Total Reaction Time to Ten Emergency Situations) (Variable 83)

The normal groups reacted faster than the EMR groups on total reaction time. However, there was no relationship with accident-violations criterion variables for the normals. There was a positive relationship with criterion 154, 156, and 157, for the EMR total group. There was a positive relationship with criterion 157. Also, the multiple correlation reveals a beta weight of .153 with criterion variable 157. However, the partial correlation for this group with criterion variable 157 showed variable 83 to be inter-related to other variables and not an independent variable (Reference Appendix Q-9) Total reaction time braking was an independent predictor variable for the total EMR groups. (Reference Appendix Q-8)

Total reaction time, (immediate and apparent situations) was a good predictor of accidents for the male EMR group. The faster their reactions, the more accidents and violations reported.

Reaction Time-Braking (Average of Immediate, Apparent and Total Emergency Situations) (Variables 95, 96 and 97)

On Variables 95, 96 and 97, averages of reaction times (these were averages of situations reacted to by the subject, not the total situations presented on the film), the EMR groups all reacted slower than the normals.

There was a positive relationship between variable 95 and criterion variables 152, 154 and 156. This indicates that the slower the EMRs react to immediate emergency situations, the less likely the chances of having violations and accidents. There was no relationship between reaction to immediate emergency situations and any of the criterion variables for the normal groups.

The female normal group reacted faster than any other group and the female EMRs reacted slower than any other group on variable 96. There was a positive relationship between variable 96 and criterion variable 154, for the total and male EMR group.

There was a positive relationship between variable 97 and criterion variable 154, 156 and 157 for the total and male EMR groups. However, the partial correlation for the male EMR group with criterion variable 157, showed variable 97 to be inter-related to other variables. (Reference Appendix Q-9) There were no significant correlations for the normal group and variable 97 with the criterion variables.

The faster these groups reacted (applying the brake) to emergency driving situations on film, the more likely the chances of their being involved in accidents or violations.

Reaction Time-Steering (Summary of Reaction Time to Steering Left Situations (Variable 84)

The normal groups reacted faster than the EMR groups, but in most cases, it was not related to accident involvement in reacting to emergency situations by steering left. There was a positive relationship for the male normal with criterion variables 153 and 156. The faster the male normal reacted to left steering emergency situations, the more state reported accidents he had. Although this may seem unusual, there is some evidence suggesting that fast reaction time may be associated with accident susceptibility. The partial correlation revealed that for the male normal group and criterion 153, that variable 84 (reaction time left steer) was an independent variable. (Reference Appendix Q-5)

Reaction Time-Steering (Summary of Reaction Time to Right Steering Situations (Variable 85)

There was no significant difference in the means between the groups in reacting to emergency situations by steering right. However, there was a positive relationship for male normals with criterion variables 155 and 157, again indicating the faster the reaction time, the greater the susceptibility to accidents.

Also, the partial correlation for this variable and criterion variable 157, revealed that it was an independent variable. When it was controlled, five of the nine correlations dropped out. (Reference Appendix Q-12)

Reaction Time-Steering (Total of Right and Left Summaries (Variable 86)

The normals reacted faster than the EMRs on the combined reaction time of right and left steer. There was no significant relationship for the total normals and female groups and the criterion variables. There was a positive correlation for the male normal group. Also, the partial correlation revealed that for the male normal group and criterion 153 that this variable was an independent predictor of accidents. (Reference,Appendix Q-5)

There was a positive relationship between criterion variables 154, 155 and 157 for the EMR total. There was a positive relationship between variable 86 and combined criterion 157 for the male EMR group. The partial correlation for this group and criterion variable 157, showed variable 86 (total steering reaction time) to be an independent variable. (Reference Appendix Q-9) This indicates that the faster the EMR perceives emergency situations to the right and left of the highway and reacts to them, the more accidents in which he is involved.

Also, for the total EMR group and criterion variable 157, the partial correlation showed total steering reaction time (variable 86) to be an independent predictor. (Reference Appendix Q-8) This indicates that the faster the students perceived emergency situations to the right and left of the highway and reacted to them, the more accidents and violations were reported. Again, fast reaction time may be indicative of a tendency of some students to make inappropriate responses to driving emergency situations.

Observed Speed While Driving the Driving Simulator (Variables 92, 93 and 94)

There were no relationships in speeds driven on the driving simulator with the accident violation criterion variable. However, the EMR groups drove faster than the normal groups and were observed to be less aware of their speeds than were the normal groups. This supports research by Williams and Little (1966) who found speed control of the car was poorer for the EMRs than for the normals. Also, Egan (1967) reports that the EMR students had a tendency to concentrate on the road ahead and failed to check the speedometer, therefore, had more trouble with the speed control than the normal students.

Reaction Time-Steering (Average of Steering Situations Actually Reacted to Variables 98, 99, and 100)

Averages on steering right, left and total (average of situations reacted to), on variables 98, 99, and 100, there was a significant relationship for the EMR groups on the major criterion variables. It was a negative correlation indicating the faster the reaction to steering, the less likely accidents and violations were reported.

The total EMR group reacted faster than the normals on variables 99 and 100. The male EMR reacted faster than the male normal on variable 99. The multiple correlation revealed a beta weight of -.112 with criterion variable 157 for the male normal on variable 99.

The partial correlation revealed that for the total EMR group and criterion variable 153, that Stress Test variables 81, 99 and 100 remained significantly correlated when all other variables were controlled. Only when residence was held constant, (variable 16) did the Stress Test variables become insignificant. The partial correlations suggest that these Stress Test variables are independent predictors of accidents. (Reference Appendix Q-1)

The partial correlation showed variable 99 to be an independent variable for the male normal group and criterion variable 157. (Reference Appendix Q-12) Variable 99 was an independent predictor variable for the total normal group and criterion variable 154, when it was controlled with other variables.

The reaction time variable (98, 99 and 100) proved to be independent predictors for the male EMR group and criterion variable 157. Also, for the total EMR group and criterion 157, reaction time variables 99 and 100 were independent predictors. Fast reaction time was associated with not having accidents or violations for these groups.

Discussion of Error Checks (Variables 101-130)

A discussion of the error checks has been considered in summary variables 77 through 80. Individually, none of the binary checks significantly correlated with the accident violation criterion variables. However, collectively these variables did correlate with the criterion variables.

Individual Reaction Time-Braking and Steering (Variables 131 through 149)

Braking to emergency situations on variables 131-140, the normal groups scored higher than the EMR groups on each of the individual emergency situations. The EMR females have the slowest reaction time of all six groups.

The EMRs reacted slower than the normals in seven out of nine emergency situations, but on the averages of steering reaction time variables 99 and 100, the EMRs reacted faster than the normals.

This study found that the normal groups of students reacted faster to emergency braking situations while driving than the EMR students. However, in this study, the EMRs reacted faster to the steering situations than the normals. This fact is evident when examining all the emergency situation variables on the Stress Test. However, Kahn (1955) reporting on reaction time found that the reaction time of the retarded student fell within the normal distribution of reaction time for the general population. Kahn does not describe the instrument he used to measure reaction time in his report. If it were a simple reaction time device, such as pressing the brake pedal when a stimulus (light) comes on, then this could explain his results, since only a simple decision had to be made by the subject taking the test. The measurement of reaction time in this study was accomplished while the subject was driving (driving simulator) to a film of emergency situations. The emergency situations the subject reacted to were realistic, such as would be experienced when actually driving an automobile. Therefore, the subject had to perceive the emergency, make the correct decision and react accordingly. The perceptual skill and decision making process that entered into this reaction time test could have been the distinguishing factor that accounted for the slowness in responses for the EMR subjects.

Egan (1967) found that the EMR students scored considerably below the normal students on a complex reaction time test.

Use of Seat Belts in Driving Simulator (Variable 87)

Only two to three percent of the groups in this study used seat belts. There was no significant relationship between seat belt usage and any of the criterion variable for any group.

Incorrect Handling of Steering Wheel On Driving Simulator (Variable 88)

The EMR groups averaged more steering errors than the normals. But there was no relationship between improper use of the steering wheel and the criterion variables for any of the groups.

Incorrect Braking on Driving Simulator (Variable 89, 90 and 91)

A higher percent of EMR groups were braking improperly than the normal groups in this study. There was a positive relationship between improper braking and criterion 153 and 157, indicating that those not braking in a normal fashion have more accidents and violation on the combined criteria. The female EMR groups had more braking errors than all other groups. Variable 89 (improper braking) was an independent predictor for the total EMR group criterion 157. (Reference,Appendix Q-8)

Bender Gestalt

The Bender Gestalt test was used in this study as a possible screening device for brain injury. However, the results of this test were not included in the final analysis. Presented on the following pages is a brief discussion of a random sample of Bender Gestalt Results.

Table 19, page 114 shows an analysis of a random sample of Bender Gestalt results for twenty-four EMRs. All the EMR groups were represented except females who had no Driver Education and were involved in accidents. The test was utilized as a screening device for the possibility of organic problems or major psychosis. All the scores were based on the adult correct response norms. The average error for the twenty-four sampled was .79 or less than one error per subject. Three-fourths of the sample had no errors again based on adult scoring norms. The nineteen errors for the twenty-four projects could be due to sloppiness, unconcern reflection of mental age, or perceptual development. Since the test was developed as a screening device for young children with rather inconclusive norms and because of the unusual testing situation, a further analysis was not included in the main data bank for relationships between criteria variables and predictor variables with the Bender Gestalt results. There was no reason to believe that the majority of the EMRs had organic problems since less than one-half of one percent (.04) of the sample had three or more errors. Future research might be conducted for the development of a similar test for all potential drivers where a more careful clinical analysis of the results could be quickly scored.

Table 20, page 115 shows the analysis of specific Bender-Gestalt errors for a random group of twenty-four EMRs out of the total 334. Each of the nine Bender figures has been stated by the test author as an indication of brain injury for children ages 5 to 10, utilizing the scoring criteria and descriptors concerning indicators of brain-injury. When the analyses are missing from Figure A or when Figure A has disproportionate parts or the rotation of design by 45^{o}, the author states this as indicative of brain injury at all age levels. These errors did not occur in the five errors on Figure A which accounted for one fourth of the percentage of total errors. Figures 3 and 5 are supposed to be highly significant at all age levels for indicating

brain-injury according to the authors measuring the line of the series of dots. This was not found in the test sample. A failure to integrate parts for Figure 6 is supposed to be significant for diagnosing brain injury for all ages. No errors were made on Figure 6. A further analysis of the scoring criteria fails to reveal any pattern which would be related to organicity. Therefore, the few errors that were made for the EMR group did not follow a set pattern or show common elements which would lead to a further clinical diagnosis thus influencing the main findings of the study.

TABLE 19

ANALYSIS OF A RANDOM SAMPLE OF

BENDER-GESTALT RESULTS FOR EMRS

(N=24)

Cell No.	Group	Number	Number of Errors	Specific Errors by Number of Letter From Test Figures
7	No. Acc. No Dr. Ed.-Male	6	0	- - -
1	Acc. Dr. Ed.-Male	3	0	- - -
5	Acc. No Dr. Ed.-Male	2	0	- - -
8	No. Acc. No Dr. Ed.-Female	2	0	- - -
2	Acc. No Dr. Ed.-Female	1	0	- - -
5	No Acc. Dr. Ed.-Male	1	1	7
6	No Acc. Dr. Ed.-Female	1	1	A
5	No Acc. Dr. Ed.-Male	1	2	A and 4
7	No Acc. No Dr. Ed.-Male	1	2	3 and 7
3	Acc. No Dr. Ed.-Male	1	2	A and 8
7	No Acc. No Dr. Ed.-Male	1	3	3, 7 and 8
3	Acc. No Dr. Ed.-Male	1	3	A, 3 and 8
7	No Acc. No Dr. Ed.-Male	1	5	A, 3, 4, 7 and 8

TABLE 20

ANALYSIS OF SPECIFIC BENDER-GESTALT ERRORS

FOR A RANDOM GROUP OF EMRS

(N=24 EMRS)

Specific Error by Number or Letter for 9 Figures	Number of Errors Made	Percent of Total Errors
A	5	.26
1	0	.00
2	0	.00
3	4	.21
4	2	.13
5	0	.00
6	0	.00
7	4	.21
8	4	.21
TOTAL	19	1.00

CHAPTER VI

A. SUMMARY, CONCLUSION AND RECOMMENDATION

Age of the Normal students in this study is related to having accidents and violations. Age was an independent predictor of accidents and violations for the male Normal subject. The older the Normal students were, the more likely they were to have reported accidents and violations. The height and weight of the subjects tested were related to self and state reporting of violations. The taller and heavier the Normal subjects were, the more likely they were to report accidents and violations. However, the partial correlations revealed that height and weight of the subjects were inter-related with other variables, and therefore, could not be used as independent predictors of accidents and violations.

Ten percent more of the Normal students reported that they wore glasses than the EMR students. But the wearing of glasses was not related to any of the criterion variables. Also, the handedness of the individual made no difference in terms of accidents or violations.

The Normal students were in higher grades in school and younger in age than the EMR students. Class in school was related to the combined criterion variable 157, for the total Normal group. It was related to criterion variables 152, 154, 155 and 156, for the Normal students. The higher the grade in school, the more likely accidents and violations were reported.

More of the normal students lived in the cities and suburbs, than the EMRs who came primarily from the rural areas. Males living in the cities had less accidents than those living in all other areas. The residence variables were related to the criterion variables in all methods of analysis. Specifically, variable 17 was an independent predictor of accidents.

Father's occupation, a measure of socio-economic status, was not related to the criterion variables except for the normal females and criterion variable 153 (self-reported violations). Normal females who came from homes where the father was skilled, reported more violations. This may indicate that the higher the socio-economic background of the parents, the more the daughter drives and the more

violations she will probably commit.

An examination of the Driver Evaluator sub-tests scores reveals:

Visual Acuity: Contrary to many popular theories, high acuity scores were not reliable indicators of a driver's ability to avoid accidents and violations. This study showed that the higher the acuity scores, the more self-reported violations, indicating that visual factors by themselves do not lead to violations or accidents.

Distance Judgement: There were no relationships for the distance judgement scores to the accident violation criterion variables for the Normal groups.

Color Vision: There were no relationships for the color vision scores with the accident violation criterion variables for the Normal group.

Field of Vision: Field of Vision, variables 27, 28 and 29, was related to the accident violation criterion variables in all methods of analysis. Total Field of Vision was an independent predictor of state-reported violations. This study showed that the higher the field of vision scores, the more accidents and violations. It can be concluded that peripheral vision defects are not the sole cause of accidents or violations.

The Wilson Test of Driver Selection was an excellent predictor of accidents for the Normal groups. Normal drivers in this study who had higher scores on the Wilson sub-tests had fewer accidents. All methods of analysis showed that Wilson variables to be significantly related and independent predictors of accidents. The Steadiness Test variables and percent of Wilson Tests passed variables were independent predictors of accidents for the total and male Normal groups.

The Sixteen Personality Factor Questionnaire did not significantly correlate with any of the accident violation criterion variables. The Sixteen Personality Factor Questionnaire only revealed differences in personalities between EMRs and Normals in this study.

On the Pennsylvania Manual Test and Siebrecht Attitude Scale, the Normals scored significantly higher than the EMRs. There were no significant correlations between test scores on these two tests and the accident violation criterion variables for the Normal group.

More Normal drivers tested had Driver Education than the EMR groups. Normal females who completed driver education reported more accidents and violations than those who had no Driver Education. This is in direct opposition to the Female EMR group. Driver Education for the Normal Females was supported by the zero-order correlations and multiple correlations, but in the partial correlation, Driver Education was inter-related to other variables and was not an independent predictor of accidents.

There was no significant correlation between the Driver Education variables and the accident violation variables.

On mile driven per year, there was no significant difference between Normals and EMR students. However, for the Normal students, miles driven per year was a good predictor of accidents and violations. The more they drove, the more accidents and violations they reported. Normal students drove less than the EMR students. Driving experience in months was a good predictor of accidents for the Normal drivers. The longer the driving, the more likely they were to have reported accidents and violations.

When driver license restrictions were analyzed, it was found that more Normals had restrictions on their operator license than EMR students. However, there was no relationship for driving restrictions with any of the accident violation criterion variables.

An examination of total binary errors, (braking, steering, signals and speed) on the simulation test revealed that there was no significant difference on the mean scores between the groups. However, speed, steering and signal errors were related to the combined accident violation criterion variable 157. This indicates that the more steering, signals and speed errors the Normal had on a driving simulator, the less likely the chances of their being involved in accidents and violation.

In reviewing reaction time to immediate and apparent emergency driving situations as measured by the Simulator Test, the Normals reacted faster than the EMRs to the majority of situations. The Normal Females had faster reaction times than any other group, as compared to EMR Females who had the slower reaction times of any of the groups.

Only Variable 84 (Total Reaction Time to Left Steering) and Variable 85 (Total Reaction Time to Right Steering), of all the Reaction Time Variables, were independent predictors of accidents. This finding applied only to the Male group. The implication being, the faster Males react to emergency situations by steering right or left, the more accidents they may have.

B. SUMMARY FOR EMR GROUP

Accidents appeared to be distributed in equal proportion in all ages for the EMR students. Age for this group did not significantly correlate with any of the accident violation variables.

The height of the subjects tested did not make any difference in the number of accidents or violations reported.

This group weighed on the average of seven pounds more than the Normal group. For the Female group, heaviness was significantly correlated with the accident criterion variables. The heavier the girls were, the more accidents they reported.

Ten percent more of the Normal students wore glasses than the EMRs. Wearing of glasses was related to not having accidents or violations for the Female EMR student. This makes it most imperative that either the parents, the school or social agencies provide glasses for these Females prior to their driving, if needed. Handedness of these students made no difference in terms of accidents or violations.

Class in school ranked high as a predictor of accidents for this group. The higher the grade in school, the more likely they were to have accidents. Often, EMRs and Normals may be in the same grade in school, but the EMRs are usually older chronologically, therefore, they have been driving for a longer period of time. The fact that they have been driving longer and exposed to more traffic situations may have some relationship to the number of accidents and violations they reported.

Residence of EMR students was related to accident and violation involvement. For the total group, residence was a good predictor of state reported accidents, but the partial correlation revealed that it was inter-correlated with other variables and not an independent predictor of accidents for this group. Therefore, residence by itself cannot be used as a predictor of accidents, but may only be considered in combination with the other variables involved. The majority of students in this group came from rural areas while the normals were primarily from the cities and suburbs.

EMRs who lived in cities or suburbs had more accidents than those who lived in the town or country. This can be explained in part by the driving conditions in the city and suburbs and exposure rates to potential accident situations.

Father's occupation for this group was related to accident and violation involvement, particularly for the Females. EMR Females who came from homes where the father was more skilled in his job occupation, had more accidents than those who came from homes where the father was unskilled. Father's occupation for the Females was an independent predictor of accidents and violations.

Visual acuity in the left eye for the total group was negatively related to the accidents and violations variables. For the male EMR students, visual acuity correlated with self-reported violations. This indicates that the higher the acuity scores, or the better the vision in the left eye, the more accidents and violations were reported.

Visual acuity in the right eye for the total group and males, had a negative correlation with state-reported accidents. This also indicates the higher the acuity scores, the greater the involvement in accidents. The multiple correlation shows that acuity in the right eye, ranked high as a predictor of accidents for the males. The partial correlation revealed that acuity in the right eye was an independent predictor for the males.

The EMR Females had the poorest vision in acuity tests, of all groups tested. This would indicate the need for a careful screening of EMR females who are learning to drive and a recommendation for corrective lenses when needed.

The ability to judge distance, as measured by the A.A.A. Driver Evaluator, was positively related to accident involvement. The more accurate these students were in perceiving situations which were close to them, the less likely they were to have reported accidents. Poor distance judgement is caused by defective vision in which one eye is weak. This can be alleviated with corrective lenses. Again, it is imperative that careful screening for visual defects be conducted by a competent optometrist. The Driver Education teacher should insist that visual corrections be made before the EMR student starts practice driving.

There were no significant relationships between color vision and any of the criterion variables for these groups.

The Females had lower scores than any other group on the Field of Vision tests. This indicates a weakness in both eyes for this group and shows a definite need for specialized training. Tunnel vision is habitual and should be corrected through awareness and practice, so that all drivers will compensate for this weakness while driving.

Field of vision in the right eye for the total group was negatively related to state reported violations 154. The higher the score on peripheral vision in the right eye for the total group, the more state-reported violations.

The EMR groups scored lower than the Normal groups on the Wilson Driver Selection sub-tests. The Females had lower scores in most of the tests than any of the other groups. In most of the tests, the Normals had a greater number complete, correct and percent correct.

Several Wilson variables were related to accident violation involvement for the EMR groups.

1. For the total group and state reported accidents (153) the following were independent predictors:
   a) Recognition of simple detail (number complete-variable 36)
   b) Eye-hand coordination (number complete-variable 42)
   c) Number of Wilson Test passed (variable 49)
   d) Percent correct for six Wilson Tests (Variable 52)

2. For the total group and the combination of accidents and violations (variable 157), the following were independent predictors:
   a) Depth Visualization (percent correct-variable 35)
   b) Number of Wilson Tests passed (variable 48)
   c) Percent of Wilson sub-tests correct (variable 51)

The number complete of the Wilson sub-tests proved to be a good predictor of accidents for the Females. Wilson Test 3, recognition of simple detail, ranked high in the multiple correlation as a useful predictor of accident susceptibility. Also, percent correct of the six Wilson sub-tests ranked high in the multiple correlation and can be used as predictors of accidents.

The factors from the Sixteen Personality Factor Questionnaire did not significantly correlate with any of the accident violation variables. The Sixteen Personality Factors in this study did not predict accident or violation susceptibility.

The EMR students, in general, scored lower in the Pennsylvania Manual Test than the normal students. The girls in this group who had higher scores, although not as high as the Normal students had a greater number of accidents and violations. It is expected that retardates who have reading problems might score lower on this test which requires critical reading and decision making. The EMR driving student will probably need special reading instruction with specially adapted manuals for beginning drivers, if they are to comprehend the regulations governing safe and legal driving.

The results relative to scores on the Siebrecht Attitude Scale are similar to those of the Pennsylvania Manual. The scores for the EMR Females again produced a negative correlation with the accident and violation criterion variables, indicating that the higher they scored, the more likely they were to have had accidents. The partial correlations and beta weights indicated that the Siebrecht Scale is a fair predictor of accident susceptibility for EMR Females. The EMR Males scored lower than their normal counterparts on the Siebrecht Scale, but there were no significant correlations between these scores and accident involvement.

The EMR students reported less participation in Driver Education. The positive correlation between the retardates and the lack of Driver Education indicated more accidents. These findings make rather obvious the need for special Driver Education programs for the EMR.

Although there were no significant results reported for the EMR students in relation to the number of miles they had driven, there were some important facts concerning the driving experience in months. Generally, the retardates had been driving approximately one year longer than the normal students. Driving experience was related to accidents and violations for the Female EMR student and can be used as a predictor of accidents and violations.

Fewer EMR students had restrictions recorded on their licenses (glasses, special mirrors or other special controls).

The braking, steering, signals, and speed checks on the driving simulator was an independent predictor of accidents for the EMR students.

The EMRs reacted slower than the Normals in most of the emergency driving situations which required braking and steering. There were positive correlations for the braking and steering reaction time variables with the criterion variables for the EMR students. This indicates that the faster they reacted to emergency situations,

(applying the brake or turning the wheel of the Driver Simulator to the right or left) the more likely the chances of their reporting accidents and violations.

The EMR students were observed to average more incorrect hand positions on the steering wheel which was indicative of their lack of Driver Education and possible lack of coordination. Also, the EMR students drove faster on the driving simulator than the Normal students and were less aware of the speed they were driving.

C. RECOMMENDATIONS FOR NORMALS

It was found in this study, that in most of the tests the Normals scored higher than the EMRs. They also reported accidents and violations. If the objectives of this study are to be met, improved Driver Education programs must be recommended for the Normal student as well as the EMR student.

It is recommended that an advanced driving course be offered to all high school students during the last semester of their senior year in school, in regard to the finding that the older the Normals were, the more they were involved in accidents. A course, designed to prepare the student to avoid or react to emergency driving situations, such as the National Safety Council Defensive Driving Program may meet this need.

High school seniors may have been driving from one to three years and probably know proper driving procedures, but too often they have had just enough experience to consider themselves skilled drivers and often develop a false sense of security about their ability to operate a car. These students, in too many cases, have not been trained how to drive effectively under emergency situations, and therefore, when an emergency presents itself, an accident often follows.

Socio-economic background played a role in accident and violation involvement, particularly for the females. The higher the socio-economic background, the greater the probability that the female drove and therefore, the greater the likelihood they reported accidents and violations.

Closer parental supervision of teenage drivers is advocated. Perhaps the first year, a young driver has his license, he should not be allowed to drive alone. The student should drive under close parental supervision and guidance, so that the young driver is exposed to controlled driving experiences. Just because a student

studies and passes a course in Driver Educat on and then passes a state driver examination, is no guarantee that he is ready to drive alone. Too often, when students acquire a driver's license, they are allowed to use the family car without parental supervision which may lead to violation and accident involvement.

The results of this study indicate that scores on visual testing devices such as the driver evaluator are not predictors of accident and violation involvement. Driver Education teachers and state license examiners may want to consider a re-evaluation of testing devices currently being used for vision and consider paper and pencil tests of perceptual speed and spacial relations such as the Wilson Test of Driver Selection. The Wilson Test, in this study, was an excellent predictor of accidents and violations. Normal drivers in this study who had higher scores on the Wilson sub-tests had fewer accidents. All methods of analysis showed the Wilson variables to be significantly related and independent predictors of accidents.

The Sixteen Personality Factor Questionnaire (16 P. F.) used in this study revealed differences in personalities between EMRs and Normals. However, none of the personality characteristics were related to accident-violation involvement. Heath (1958) found that personality characteristics can distinguish accident from accident-free drivers and perhaps another personality scale should be used in future research.

An improved Driver Education program should be made mandatory for all students who desire to obtain a driver's license. Despite the fact that Driver Education in this study indicated no significant relationships for normal male students with the violation and accident criterion variables and revealed that normal girls with Driver Education had more reported accidents, a recommendation is that improved programs of Driver Education should be developed. These programs must emphasize simulated driving emergencies and classroom theory, which stress reactions to emergency situations.

D. RECOMMENDATIONS FOR EMRS

Since this study revealed that EMRs scored lower on most of the tests and those not having Driving Education reported more accidents and violations, school administrators and Driver Education teachers should become aware of the immediate need for special extensive and intensive training programs for EMR students.

A recommendation is made that a Driver Education Program be developed that will meet the needs of retarded students. The genesis of such a program lies with the colleges and universities designated as teacher training institutions. The prospective Driver Education and Special Education teachers should be offered a special certification program designed to find ways and means of teaching the slow learner how to live safely. This will require a special course on the graduate level for in-service teachers of Driver and Special Education. These courses should investigate the particular safety methods and materials which are applicable for use with retarded adolescents. Parallels for highway safety would be drawn from learning theories for the introduction of special materials to Special Education students. Courses should be designed to provide an opportunity to create, design, develop and produce safety materials for retarded adolescents, with emphasis placed on creativity in material design as it is related to factors of motivation and interest to teenagers.

This study and other related literature shows a number of intellectual and psycho-motor skills in which the EMR student differs from the Normal, and in some cases, where the EMR and Normal student are quite similar. Therefore, seminars and workshops should be offered to in-service Driver Education teachers and teachers of exceptional children. These programs would emphasize an understanding of the intellectual, physical, sensory, social and emotional aspects of retarded and other exceptional children with implications for driving safely in various environmental situations. Integrating Special Education and Driver Education should produce teachers, who through proper preparation, will develop worthy citizen drivers despite their relatively low mental qualifications. If the student is classified as retarded, educators must be prepared to instruct him to live safely in a motorized society.

The teacher who is prepared as suggested above, in the high school Driver Education program, would initiate a comprehensive program to meet the interest and needs of the EMR student.

Recognizing the limitations of EMRs, as supported in this study, the teacher should enlist the aid of health services personnel (school doctors and nurses) to assist in screening students, so that they can teach each individual according to his physical limitations. Also, the school Guidance Counselor should be consulted to obtain information pertaining to the students' social, emotional and mental characteristics. This information will give the teacher a profile of the student, which will enable the teacher to present situations that will provide the knowledge and skills that were found to be deficient among EMR students as found in this study.

Some of the limitations revealed in this study, of which teachers should be aware, are that the EMR females scored lower on most tests than any other group. This indicates a need for an extensive program of instruction for the EMR female, taking into consideration their reading level and visual defects as revealed in this study.

In this study, the retarded population was found to be chronologically older and lower in class in school than the Normals tested. Driver Education should be made available to these students at an earlier age, so that when they do acquire a driver's license, they will be more adequately prepared to drive safely. Perhaps for the retarded adolescents, the following sequence should be considered:

A. 9th Grade - Testing and screening by school personnel. (School Nurses, Counselor, Driver Education teacher, Special Education teacher and family Physician.) Basic vocabulary study related to a specific revised state manual and driver education texts prepared for the EMR student. Reading comprehension to provide an adequate understanding of the regulations and procedures pertaining to safe driving.

B. 10th Grade - Classroom theory of driving, provided by the Driver Education teacher, grouped with the Normal students.

C. 11th Grade - Practice driving instruction with detailed emphasis on how to operate the car in practical driving situations and emergencies. This should include instruction on driving simulators, driving ranges and in street and highway traffic. No time limit should be set for the EMR students. They should be permitted to practice until they are proficient.

D. 12th Grade - Attend a short refresher course in Driver Education that includes driving emergencies, such as the National Safety Councils Defensive Driving Course.

Action should be taken in each states Department of Highway and Education to develop a state driving manual relative to legal requirements for driving, which would be on an appropriate reading level for retarded students in secondary schools.

A review of the literature revealed that there are few textbooks and little instructional material available designed for use by EMR students. However, the materials that are available can be of value to the teacher of EMR students and should be carefully evaluated.

A continuing program of research, study and evaluation must be conducted if the accident problem with the motor vehicle is to be resolved.

E. CONCLUSIONS

1. Accidents appeared to be distributed in equal proportion for all ages among the EMR students. However, the older the normal students were, the more likely their involvement in accidents and violations.

2. EMR Females who came from homes where the father was more skilled in job occupation had more accidents.

3. Normal Females who came from homes where the father was more skilled in job occupation had more violations.

4. EMR Females had poorer visual acuity than any other group.

5. EMR students reported less participation in Driver Education Programs than Normal students.

6. EMR students who had Driver Education, were less likely to have accidents or violations.

7. There were no significant differences on the mean scores for braking, steering, signals and speed errors on the driving simulator between the EMRs and Normals.

8. The EMRs reacted slower than the Normals to the majority of emergency situations when breaking and steering.

9. Female retardates scored lower, were slower, and did poorer on all predictor variables than all other groups.

10. The retardates were observed to drive faster and be less aware of the speeds they were driving on the driving simulator than the Normals.

11. Retardates who lived in cities or suburbs had more accidents than those who lived in the town or country.

12. The more accurate retardates were in perceiving situations which were close to them (distance judgement) the less likely they were to have reported accidents.

13. Retardates who scored higher on Wilson Test 3 (Recognition of Simple Detail) and Wilson Test 5 (Eye-Hand Coordination) were less likely to have accidents and violations.

14. Retardates scored significantly lower than the Normals on the Pennsylvania Manual Test and Siebrecht Attitude Scale.

15. Retardates were observed to average more incorrect hand positions on the steering wheel than the Normals which was indicative of their lack of Driver Education and possible lack of coordination.

16. Normal Males living in the cities had less accidents than those living in all other areas.

F. IMPLICATIONS FOR FUTURE RESEARCH

Consideration should be given to the development of new and different psycho-motor tests, with emphasis on other dimensions of movement as compared to the results found in this study. The paper and pencil tests used in this study should be restandardized using samples of retarded students. Reading levels should be controlled so that test scores can more accurately determine differences due to intelligence.

Research should be conducted utilizing the Wilson Tests and populations from different geographic areas. Also, subjects used in future research with the Wilson Test, should be older than the subjects in this study.

Research should be conducted using Stress Test variables in other kinds of simulated situations. Slides should be considered in future research along with modifications of Stress Tests in automobiles.

Future research concerning the comparison of retarded and normal students should utilize other tests than the ones utilized in this study, but in the same area of personality and psychomotor development.

A national survey and study should be initiated by sampling populations in all states and regions by comparing exceptional students with normal students.

Future research should be concerned with an analysis of individual accident data including specific factors involved at the accident scene, such as road conditions, time of day, and reason for being on the highway at the time of the accident. This should be done by comparing retarded and normal adolescents.

More research should be conducted comparing females with males and retarded females with normal females, in a concerted effort to verify true differences between sex and intelligence in driving patterns and behavior.

Driving manuals from individual states should be developed utilizing controlled reading levels, so that retarded students and other illiterate populations can understand the essentials needed for safe driving.

The Field of Vision should be further researched using other populations in the areas of visual acuity, distance judgement, and field of vision.

Future research should be concentrated on reaction time and its relationship to age, sex, and intelligence.

More research is needed to delineate the effects of Driver Education on future safe driving. Several modifications to current Driver Education programs should be initiated and longitudinal research conducted such as follow-up on retarded and normal children from Driver Education programs.

APPENDICES

APPENDIX A

NAME: Visual Motor Gestalt Test; (Lauretta Bender, M.D.,1946)

ADDRESS: Publisher, The American Orthopsychiatric Association, Incorporated

TEST INFORMATION:

The Bender-Gestalt Test consists of nine simple designs, each of which is presented one at a time to a subject for copying on a single sheet of 8 1/2 by 11 white paper. Memory is not involved, since the subject merely copies each figure. There is no time limit for the completion of each design.

The Bender-Gestalt Test is used as a maturational test in Visual Motor Gestalt functioning in children. Other uses of the Bender-Gestalt include: an exploration for retardation, to discover functional losses due to organic brain defects in children and adults, and to explore personality deviations.

TEST USAGE-PRESENT STUDY: The test was given to aid the normal and retarded children as a screening device for brain-injury or apparent visual perceptual problems.

A random sample of the test for the Educable Mentally Retarded subjects were evaluated according to correctness based on the adult criterion.

Individual designs for twenty-four EMR tests were analyzed and scored to determine if there was any major deviations from normal adult responses being made which could warrant the inclusion of the test scores in the final statistical analysis.

The tests were administered in groups to the normal and retarded by presenting each figure on a screen via a slide projection. This procedure may have influenced the responses and is in variance to the original purpose of giving each figure individually.

Motivation and general interest in drawing the figures could have influenced the results. Two dozen EMR tests were scored to determine if particular groups made consistent or numerous errors when copying the designs. (See Discussion chapter for additional analyses of the EMR tests that were scored.)

APPENDIX B

NAME: Driver Evaluator

ADDRESS: American Automobile Association, 1712 G. St., N. W., Washington 6, D. C.

TEST INFORMATION:

The Driver Evaluator consists of four vision tests: distance judgement, visual acuity, field of vision and color vision. A mirror is used at 10 feet to give an apparent distance of 20 feet. This permits testing in a small room about 13 feet long. The tests are all given with the driver seated in front of the evaluator and with the examiner at the side. The mirror arrangement insures that the tests will be given at a standard distance.

Visual Acuity. This consists of four Snellen Charts printed on an aluminum paddle wheel inside the cabinet. Black and white letters are used on a flat white background. Each chart can be exposed by turning a knob in front of the examiner. Another knob operates a shutter so that either eye or both eyes can be tested. A miniature chart on the side of the cabinet makes it easy to check the responses as being right or wrong. Four 15 watt lamps insure uniform illumination above 10 foot candles. Distance is kept constant since the subject must look through the eye piece and cannot "creep up" on the charts. Each chart has 14 letters accurately graduated in size to measure acuity from 20/100 to 20/13.

Distant Judgement. Three miniature cars are placed in random positions, and the subject is asked to identify the car which appears farthest and which appears nearest. A dial on the side enables the examiner to set the cars in eight different patterns. The subject is thus required to make sixteen judgements. The examiner records the number of correct responses. The test is fairly quick to administer, since the subject simply makes a judgement instead of adjusting the cars back and forth. Constant uniform illumination is provided by four watt lamps.

Field of Vision. This test consists of a platform 20 inches in diameter, hinged just below the eye-piece. In taking the test, the subject focuses on the center car at an apparent distance of 20 feet. Unseen by the subject, the examiner moves slowly forward a test target on either the right or left side. To help give consistent readings, the targets consist of 3/4 inch black and white segmented disks which rotate as they are moved forward. These targets are illuminated by two fifteen watt lamps. A scale on the side of the test nearest the examiner can be easily read to the nearest degree.

Color Vision. Inside the cabinet is a small disk with eight sections of colored glass molded from the same glass as is used in traffic signals. This insures that the red, amber and green colors will be the same as the subject must identify in a traffic signal. The color disk is rotated so the subject can see only one color at a time through a small hole in the front of the cabinet. A small lamp inside the cabinet illuminates each piece of glass as it passes the opening.

APPENDIX C

NAME: Sixteen Personality Factor Questionnaire, Low Literate, Form "E",(Herbert W. Eber and Raymond B. Cattell, 1967)

ADDRESS: Institute for Personality and Ability Testing, 1602 Coronado Drive, Champaign, Illinois, 61820.

TEST INFORMATION:

The Sixteen Personality Factor measures sixteen independent personality factors. There are eight questions for each of the sixteen personality factors, for a total of one-hundred and twenty eight questions.

The authors state, "The test is constructed so that it can be read easily by a person functioning at approximately the third grade reading level. In other words, the client whose reading level score is between grade 3 and grade 6 can read and understand all the test items in the new Form "E", can give meaningful answers to these items, and can therefore be evaluated with this instrument". (Eber and Cattell, 1967, p. 2)

The Sixteen Personality Factor is virtually self-administering after the examiner explains the purpose of the test to the examinee. Answers to the questions asked on the Questionnaire are placed on a separate answer sheet. It takes approximately thirty to forty-five minutes for an average subject to complete the Questionnaire.

APPENDIX D

NAME: The Wilson Driver Selection Test,(Clark L. Wilson, PH.D.)

ADDRESS: Martin M. Bruce, 340 Oxford Road, New Rochelle, New York

TEST INFORMATION:

This test consists of six non-verbal aptitude tests, plus an unscored page of bibliographical information. It is intended to measure ability to operate vehicles with minimal risk. The six sub-tests are visual attention, depth visualization, recognition of simple detail, recognition of complex detail, eye-hand coordination and steadiness.

The Wilson Driver Selection Test is designed to screen driver applicants with the aim of reducing accidents. It measures certain aspects of basic aptitudes which, if present to an adequate degree in a vehicle operator, reduce the risk of operator caused accidents. The individual tests in the Wilson Driver Selection Test are designed to measure the aptitude variables of perceptual speed and spatial relations which were hypothesized to be the most important aptitudes required of the efficient low accident vehicle operator. The basic rationale for this battery of tests rests with the proposition that the driver must have certain basic aptitudes to cope with this moving world successfully. If he possesses these required aptitudes of perceptual speed and spatial relations to an adequate degree, he is more likely to pass through each accident exposure situation unscathed.

APPENDIX E

NAME: Siebrecht Attitude Scale,(Elmer B. Siebrecht, Ed.D., New York University)

ADDRESS: The Center for Safety Education, Copyright, 1941

TEST INFORMATION:

The Siebrecht Attitude Scale is designed to measure attitude toward the safe driving of an automobile. This it does by measuring attitude toward the factors thought to be important in the safe driving of the automobile. The scale is self-administering and the subject must rely upon his own interpretation of the statements in the scale. It takes about ten minutes for a subject to complete the scale.

The scale consists of forty statements about factors related to driving. It is designed to measure attitude toward the following factors.

1. Passing on curves and hills
2. Driving as a privilege
3. Enforcement of traffic regulations
4. Condition of the automobile
5. Responsibility
6. Speeding
7. Cooperation
8. Examination for driver's license
9. Violations
10. Conditions of drivers
11. Courtesy, concern
12. Knowledge, skills

There are no right or wrong answers for any of the statements on the scale. The statements are presented in a manner that permits a subject to indicate the extent to which he agrees or disagrees with the idea expressed. After each statement, the subject places an "X" at the position that indicates his attitude.(___Strongly Agree ___Agree ___Undecided ___Disagree ___Strongly Disagree)

APPENDIX F

DEVELOPMENT OF SITUATIONAL STRESS TEST

One of the objectives of this study was to develop an instrument that would measure a driver's reactions to stressful situations. This instrument, in the original research proposal, was referred to as a Situational Stress Test. It was to be designed so it would measure the reaction time to, perception of, and judgement about immediate driving emergency situations presented on film. A device was to be used that would measure exact reaction time relative to stopping and turning. Also, the appropriateness of the individual response to the situation would be measured.

In proceeding with the development of the Situational Stress Test, many different possibilities were explored.

Time was devoted to working with the American Automobile Association's Complex Reaction Time Device, model #105. The initial problem encountered with this device was that it would not measure individual reaction time, but would give an average reaction time to fifteen trials. This device was modified by the installation of electronic stop clocks, so that it would record individual reactions, in terms of braking, turning right, turning left, or any combination of the three. Colored slides of emergency driving situations were staged and developed by the investigators with the help of the college photographer. This device was used during pilot testing as a means of measuring reaction time to emergency situations presented on color slides.

As work proceeded on the above, other techniques were explored as to the best manner in which to accomplish the objectives of the Situational Stress Test.

Emergency situations had to be presented to a subject on a screen behind some type of driving simulator. Upon perceiving the emergency situation, the subject has to react in terms of braking, turning right, turning left, or any combination of braking and turning. Also, a method of measuring a subject's reaction in hundredths of a second had to be developed.

As experimentation progressed on the Situational Stress Test, it was realized that the emergency situations presented as stimuli would have to be as realistic as possible, similar to what a driver

actually experiences with other drivers, pedestrians and natural road hazards. Therefore, driver education films from Aetna Insurance Company, Allstate Insurance Company and various other film companies were previewed to determine the film best suited for testing purposes.

Emergency situation sequences from Aetna's Drivotrainer System were used in pilot testing with the modified Complex Reaction Time Device.

A day was spent with representatives of the Chesapeake Systems Corporation to discuss the "Highway Systems Research Car" and its possibilities for use in the study.

Representatives from Aetna Insurance Company and Raytheon Learning Systems consulted with the investigators as to the possibility of using their equipment for our tests. It was learned that the Aetna simulation equipment was designed primarily for instructional purposes, but could easily be adapted for testing purposes.

In developing a device to measure reaction time, three systems were considered as alternates to the electronic stop clocks: I.B.M. Punch Card Systems, Multitrack Pen Recorders and Transistorized Digital Counters. After consulting with individuals competent in the field of electronics, (representatives from I.B.M., Dr. Engle of the College Physics Department, Dr. Champa of the College Audio Visual Department, Mr. Allies of the College Electronics Experimental Department and Mr. Harry Miller, an Electronics Consultant from R.C.A.), it was decided to use transistorized digital counters.

After extensive experimentation with slides, films, timers, and the complete reaction time device, it was decided that the most accurate way to conduct this test is with a Driving Simulator.

The Situational Stress Test utilizes the Link Driving Simulator and Computer Console in conjunction with an eight minute filmed sequence from the Allstate Training Film, "Hazardous Situations". For this test, the subject operates the simulator and drives to a film of driving situations. The film was made to give the driver the same view of the road and traffic conditions as he would see if actually driving a car on suburban streets. The appropriateness of his responses (braking, steering, signals and speed) is checked by the computer via a binary code on the film. A hard copy recorder then prints a permanent record of the subject's action. (Reference attached description of codes on Printer Sheet.) In addition to this printed record, the system also provides a total count of braking, steering, use of signals and speed errors accumulated by the subject during the driving sequence.

The Link System was modified to include the measurement of complex reaction time in hundredths of a second. This was accomplished by incorporating transistorized digital counters into the Computer Console. The counters are activated by a photo-electric cell which responds to the aluminum tape on the film. The digital count is then read visually by the investigator and hand-recorded on the subject's data card. Reaction time is measured for the following ten emergency situations in the film:

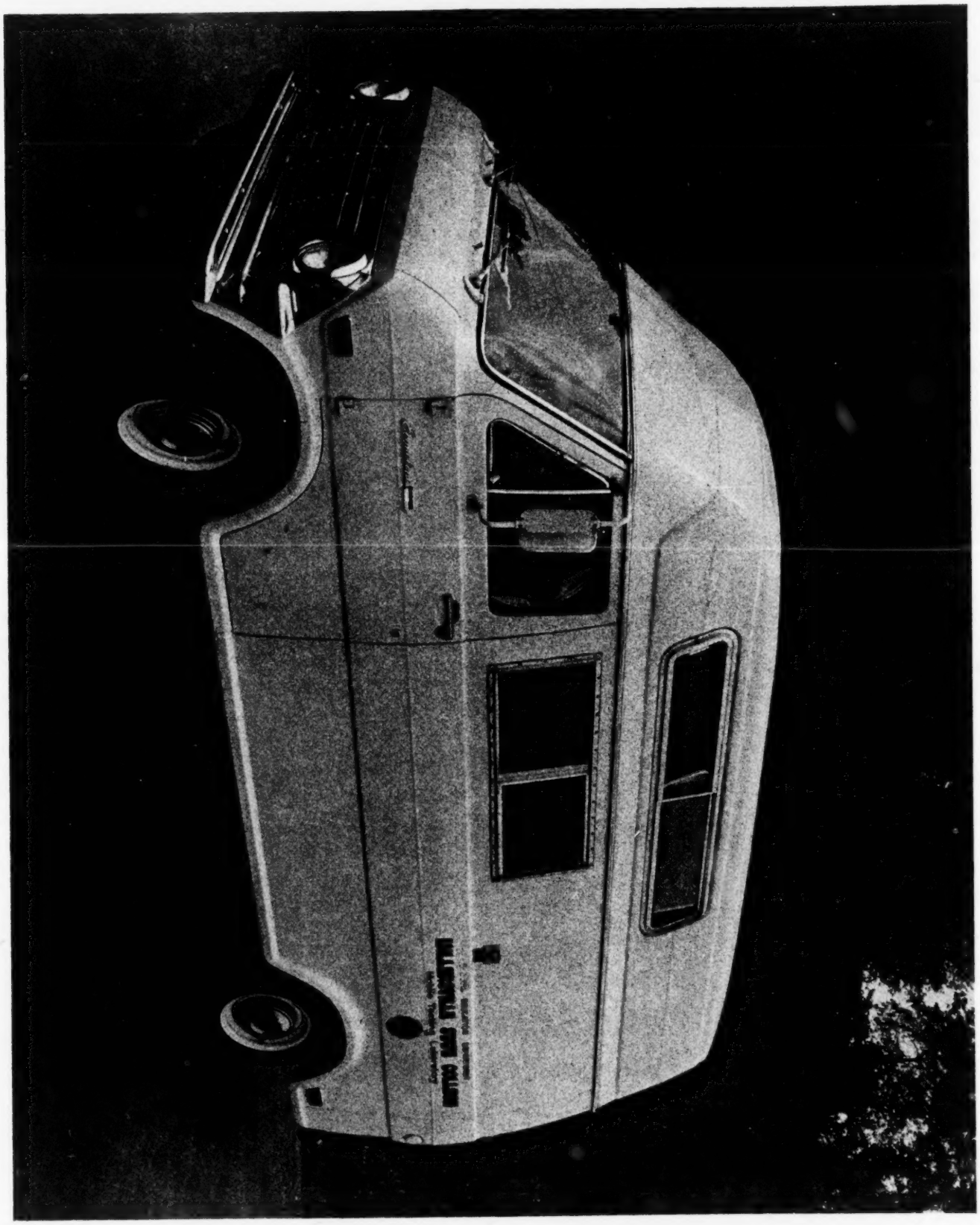
1. A man emerges without warning from parked vehicle on the right side of the street and steps into the path of the subject's car.
2. An oncoming vehicle crosses the center lane of traffic and faces subject's car to extreme right of street.
3. A car backs out from driveway on the right into the lane of travel of subject's car.
4. A car backs out from driveway on the left into the lane of travel of subject's car.
5. A vehicle making a right turn, swings wide crossing the center lane, blocking the path of subject's car.
6. A delivery man emerges from behind a parked car on the left side of the street and suddenly crosses in front of subject's car.
7. A bicyclist traveling on the right side of the road, suddenly circles back into the path of the subject's car.
8. A meter man crosses the street in front of subject's car.
9. A delivery man steps from inside a parked van-type truck in front of subject's car.
10. A car in front of subject's car stops without warning and suddenly starts to back up.

Each subject's reaction to the ten emergency situations listed were recoded by the investigator. The digital counters measured reaction time to braking, turning left, turning right or any combination of braking and turning left or right.

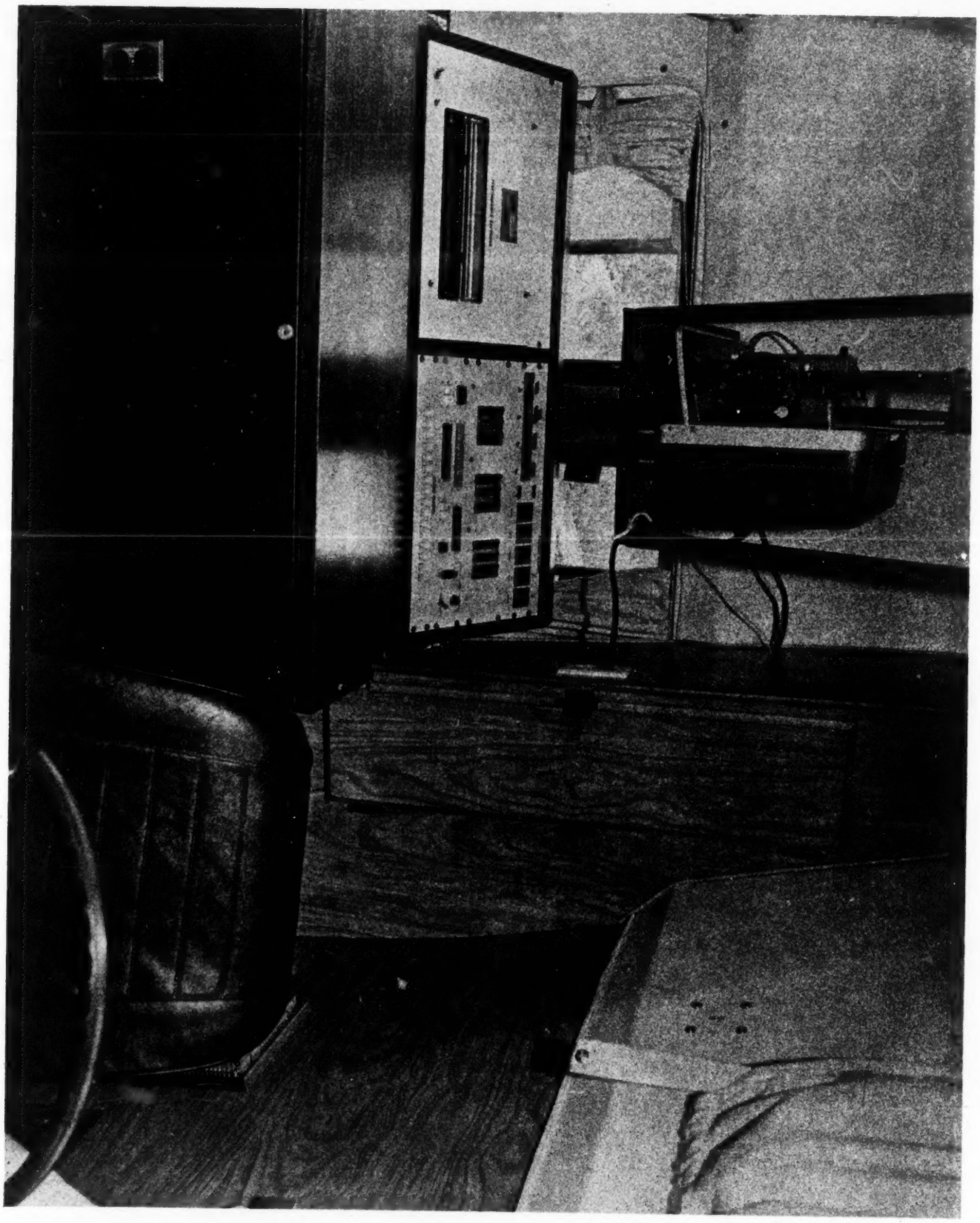
The Situational Stress Test was administered within a modified van-type truck, which was purchased for this purpose. In a testing situation, the truck was parked outside the school in an area adjacent to the room used for group testing. The subjects reported individually to the van for the test, which required approximately fifteen minutes. (Reference attached photographs of van and testing equipment.)

Prior to driving the driving simulator and taking the test, each subject listened to the following instructions. The instructions were on tape for standardization purposes. (Reference Appendix F-3)

APPENDIX F-1

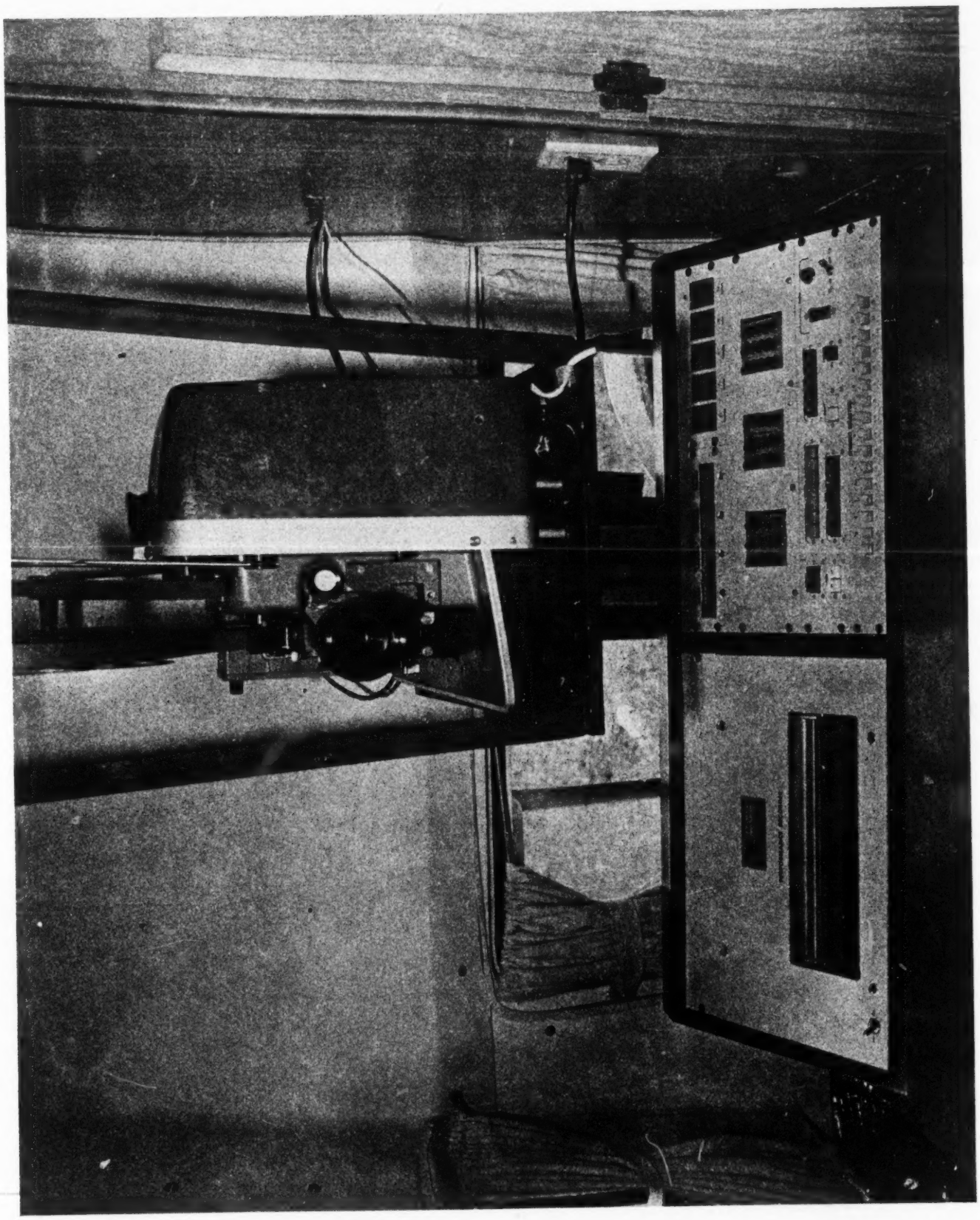


APPENDIX F-1



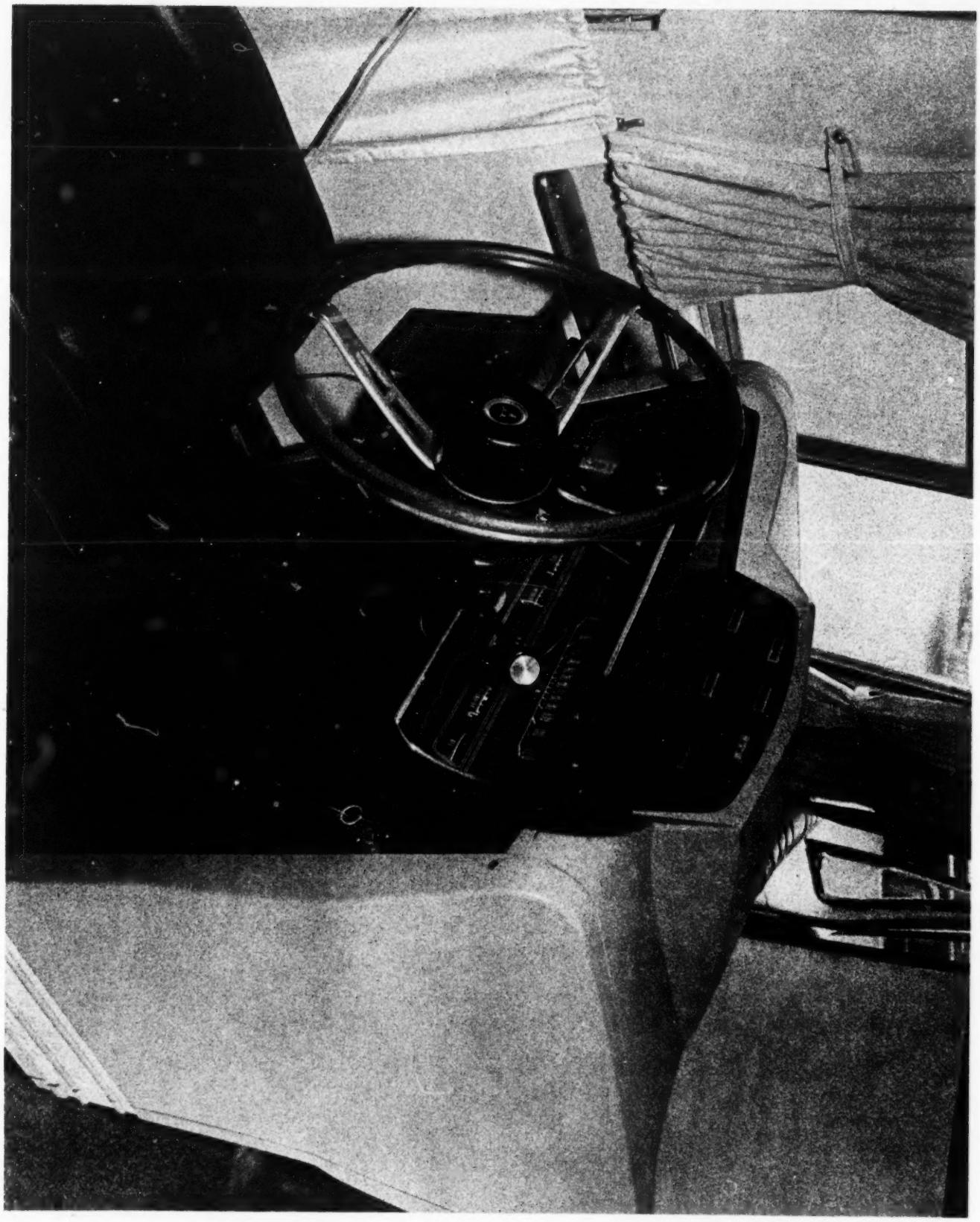
159

APPENDIX F-1



160

APPENDIX F-1



APPENDIX F-2

PRINTED RECORD OF BINARY CHECK LIST

				1	1. Foot Brake Off
			2		2. Light Foot Brake
			2	1	3. Light Medium Foot Brake
		4			4. Hard Foot Brake
		4		1	5. Parking Brake On
		4	2		6. Steering Hard Left
		4	2	1	7. Steering Medium Left
	8				8. Steering Light Left
	8			1	9. Steering Center
	8		2		10. Steering Light Right
	8		2	1	11. Steering Medium Right
	8	4			12. Steering Hard Right
	8	4		1	13. Directional Signal Left
	8	4	2		14. Directional Signal Right
	8	4	2	1	15. High Beam
16					16. Low Beam
16				1	17. Speed Zero M.P.H.
16			2		18. Speed Less than 15 M.P.H.
16			2	1	19. Speed Less than 25 M.P.H.
16		4			20. Speed Less than 35 M.P.H.
16		4		1	21. Speed Less than 45 M.P.H.
16		4	2		22. Speed Less than 65 M.P.H.

NOTE: The Check Identification Number is the total of the numbers appearing in the five columns. Example: 8 + 4 + 2 = 14

APPENDIX F-3

TAPED INSTRUCTIONS FOR

SITUATIONAL STRESS TEST

You are now seated at a driving simulator which you are going to operate. Your reason for being here is to show how you perform certain driving tasks.

Look at the simulator carefully. As you examine it, you will notice that it is very similar to the average American car.

Before you drive this "car" you should learn more about it.

The adjustment for the seat is located under the left front corner of the seat. Adjust it so you can reach the gas pedal and the brake with your right foot. Be sure that you are able to push the brake pedal all the way to the floor.(pause)

Now we are going to practice with the controls of the car. The lights on the panel at the top of your car will help you to practice.

The car has an automatic transmission. To start the car, place the gear selector in neutral and turn the ignition key to the right. Hold it there until the light on the dashboard goes off. Start your car now.

The red light marked "signals" is on. Put your left turn signal on and the light will go off. Now try the right turn signal.

Now we will practice steering. The red light "steering" is on. Turn the steering wheel slightly to the right until the light goes off. This is a slight right steer such as you would use to turn your car a little to the right as you drive down a straight road. Now, let the wheel return to the center position.

Now try medium right steering. Turn the wheel to right until the light goes off. This is a medium right steering, such as you would use in rounding an average turn on the highway. Now check to see that the steering wheel has returned to the center position.

For a hard right steer, you must turn the wheel one complete turn to the right, ---do that now. When you are in hard right steer, the light will go off. This is the way you would turn your wheel when making a right turn at an intersection. Now, let the steering wheel return to center. The procedure for steering left is the same. Now try a slight left, medium left and a hard left. (The important thing for you to remember is to let the wheel return to the center position when your turn is completed. This is done by releasing the pressure of your hands on the steering wheel and it will return automatically.

Now, let's practice braking. Notice the light marked brakes is on. Press the brake pedal lightly and the light will go off. This is light brake pressure such as you might use when gradually slowing a car. For a medium brake, you will have to press the pedal a little harder. Try pushing the pedal now. When the light goes off, you are in medium brake, such as you would use when braking for a stop sign. For a hard brake, such as you would use to stop your car suddenly in an emergency, you must press the pedal all the way to the floor. Do that now. Now push the parking brake with your left foot. Now release it.

Put your foot on the brake and place the gear selector on "D" for drive. Now move your foot to the gas pedal and press it slowly until the speedometer reads 15 MPH. The light marked "speed" will go on. Now increase your foot pressure on the gas until the speedometer reads 35 MPH. The speed light will again go on. When the light goes on, move your foot from the gas pedal to the brake. Then put the gear selector in neutral.

For the next few minutes, you will see a film of driving situations. The film was made to give you the same view of the road and traffic conditions as you would see if you were actually driving a car on suburban streets. As you watch the film, you will see the hood and rear view mirrors of a red car. Imagine that you are driving the red car you see on the screen. Drive just as you would in a real car, but remember to watch your speedometer and return your steering wheel to the center position when you have completed a turn. Try to match your driving to the car on the screen.

Now, be sure that your car is running. Set the gear selector on "D" for drive. Keep your foot on the brake pedal until you are ready to start driving.

In the scenes that follow, you are the driver of the red car on the screen. Drive as you would in a real situation. Remember to check your speed and return the steering wheel to the center position after you complete a turn.

Observe the rules of the road and keep alert.

APPENDIX G

DESCRIPTION OF TEST ON

PENNSYLVANIA MANUAL FOR DRIVERS

This test consists of twenty-five multiple choice type questions based on information taken from the Pennsylvania Manual for Drivers. The test items are similar and in many instances, often the same as those asked by the examining officer when one goes for a Pennsylvania Driver's Test. The test was constructed at Millersville by the investigators for the purpose of measuring a subject's knowledge of Pennsylvania Driving Regulations.

Upon examining this test, one may question the reading level of it, and the ability of Educable Mentally Retarded students to comprehend it. This point was considered by the investigators when the test was constructed, and the following conclusions were used as a basis for including the instrument in the test battery.

1. The terminology on the test is similar tc the terminology used in the Pennsylvania Manual for Drivers.
2. The test terminology is similar to the terminology of Driver Education teachers when teaching students to drive.
3. The test terminology parallels the terminology and used by examination officers when a subject takes a Pennsylvania Driver's Test.
4. In order to obtain a Pennsylvania Driver's License, a subject must demonstrate a knowledge of Pennsylvania Driving Regulations.
5. All subjects included in the sample possessed valid Pennsylvania Operator's License.
6. In order to obtain this license, the subject in the past had to demonstrate a knowledge of the Pennsylvania Manual.
7. Therefore, all subjects in the sample being legal drivers in Pennsylvania had been exposed to questions similar to the ones in the test.

APPENDIX G-1

TEST ON PENNSYLVANIA MANUAL FOR DRIVERS

Directions: This is a multiple choice test. Read each question carefully, then select the correct answer from the four choices under each question. Place the letter of your choice on the answer sheet. Do not write on the test booklet. When writing your answer, use capital letters.

1. A traffic light flashing red means:
   A. Slow down to 10 mph.
   B. Stop! Check both ways, then proceed with caution.
   C. Slow down, check both ways, then proceed with caution.
   D. Yield to on-coming vehicles.

2. If you buy a car, you must apply for a "certificate of title" within:
   A. 30 days
   B. 48 hours
   C. 24 hours
   D. 15 days

3. Passenger car registration expires at midnight on:
   A. January 31
   B. March 15
   C. March 31
   D. January 15

4. If you lose your car registration card, you must apply for a duplicate within:
   A. 24 hours
   B. 48 hours
   C. 15 days
   D. 30 days

5. If you are involved in a reportable accident, you must file a written report with the Bureau of Traffic Safety within:
   A. 24 hours
   B. 1 week
   C. 48 hours
   D. 5 days

6. A triangular shaped traffic sign means:
   A. Stop
   B. Yield
   C. Railroad
   D. Curve in the road

7. To be employed as a paid operator of a vehicle, you must be:
   A. 21 years old
   B. 16 years old
   C. 18 years old
   D. 25 years old

8. When parking your car near a fire hydrant, your car should be parked a minimum of:
   A. 30 feet from the fire hydrant
   B. 10 feet from the fire hydrant
   C. 15 feet from the fire hydrant
   D. 50 feet from the fire hydrant

9. An Octagon (eight-sided) shaped traffic sign means:
   A. Yield
   B. Railroad
   C. Narrow bridge
   D. Stop

10. When an on-coming car is approaching your car at night, you should dim your headlights when it is approximately:
   A. 100 feet away
   B. 200 feet away
   C. 300 feet away
   D. 500 feet away

11. What kind of automobile insurance coverage is the most important?
   A. Fire and theft
   B. Liability
   C. Collision
   D. Comprehensive

12. When traveling on a snow covered highway and the back of your car goes into a skid, you should:
   A. Turn your front wheels in the direction the back of your car is skidding.
   B. Turn your front wheels in the opposite direction that the back of your car is skidding.
   C. Keep front wheels straight and brake.
   D. Turn front wheels in the direction of the skid and brake rapidly.

13. A round shaped traffic sign means:
   A. Stop sign
   B. Railroad here
   C. School crossings
   D. Railroad ahead

14. A blind pedestrian can easily be identified by:
   A. The dog that accompanies him.
   B. Dark horned rimmed glasses that he wears.
   C. The slow cautious manner by which he approaches the interesection.
   D. The white can with a red tip.

15. In Pennsylvania, the only time a driver is allowed to pass a stopped school bus that is loading or unloading passengers is:
   A. When the school bus is stopped on a three lane highway in the far left lane.
   B. When the school bus is stopped on the same side you are traveling on a four lane divided highway.
   C. When the school bus is stopped on the same side as the school, leaving off students.
   D. When the school bus is stopped on the opposite side of the road from the school leaving off students.

16. The speed limit in a school zone when students are coming to school or leaving school is:
   A. 10 mph
   B. 15 mph
   C. 25 mph
   D. 35 mph

17. When driving in town, you should signal your intentions for a turn when you are approximately:
    A. 25 feet from the intersection
    B. 50 feet from the intersection
    C. 75 feet from the intersection
    D. 100 feet from the intersection

18. A diamond shaped traffic sign means:
    A. Danger! Hazardous condition
    B. Stop
    C. Special rule or regulation
    D. Railroad here

19. When driving, your rear-view mirror should be adjusted so that you can see a minimum of:
    A. 50 feet to the rear
    B. 100 feet to the rear
    C. 75 feet to the rear
    D. 200 feet to the rear

20. New license plates cannot legally be placed on your car before:
    A. Midnight, January 31
    B. Midnight, March 15
    C. Midnight, January 15
    D. Midnight, March 31

21. The driver who "overdrives his headlights" cannot:
    A. Stop in the distance he can see ahead clearly
    B. Adjust his eyes to dark vision
    C. Adjust to the glare of on-coming lights
    D. See far enough to the side

22. At 50 miles per hour, the minimum safe following distance is:
    A. 2 car lengths
    B. 5 car lengths
    C. 7 car lengths
    D. 10 car lengths

23. At which of the following temperatures is ice on the road most dangerous?
    A. Zero
    B. 10 degress above zero
    C. 20 below zero
    D. 32 degrees above zero

24. What lane should a driver position his car in when he wants to make a left turn from a one-way street?
    A. The lane immediately to the left of the center line.
    B. The extreme left lane.
    D. The lane immediately to the right of the center line.
    E. Any lane.

25. What should every driver have in his possession when driving a car?
    A. The vehicle registration card and the certificate of title.
    B. Your learners permit and drivers license.
    C. Your vehicle registration card and bill of sale.
    D. Your driver's license and your vehicle registration card.

APPENDIX H

COMBINATION OF STUNTS FROM

BRACE IOWA AND BRACE TEST OF MOTOR ABILITY

These stunts are specifically designed to measure such aspects of motor ability as agility, balance, control, and flexibility and to minimize the importance of size and strength. It is an excellent screening device for the rapid identification of difficulties in gross motor coordination.

STUNT #1 (Brace) Straight-line-walk test. Place heel of left foot in front of toes of right foot. Then place heel of right foot in front of toes of left foot. Take a total of ten steps in this manner. It is a failure
a) to lose the balance.
b) to fail to place heel so that it touches toes.

STUNT #2 (Brace) Single-heel-click test. Jump into the air, click heels together once, and land with feet apart. It is a failure:
a) not to click heels together once.
b) not to land with feet apart.

STUNT #3 (Brace) Full-left-turn test. Stand with feet together. Jump upward, making a full turn to the left. Land at approximately the same place from which the test was started. (Feet may be separated when landing.) Do not lose the balance, or move feet after they have touched the floor. Failure:
a) not to make a full turn to the left.
b) to move feet after they have returned to floor.
c) to lose the balance.

STUNT #4 (Brace) Double-heel-click test. Jump upward, clap feet together twice, and land with feet apart (any distance). It is a failure:
a) not to clap feet together twice.
b) to land with feet touching each other.

STUNT #5 (Brace) Heel-slap test. Jump upward, and slap both heels with hands behind body. It is a failure:
a) not to slap both heels; to move feet or to lose the balance after landing.

STUNT #6 (Brace) Full-right-turn test. Stand with feet together. Jump upward, making a full turn to the right. Land at approximately the same place from which the test was started. (Feet may be separated when landing.) Do not lose the balance or move feet after they have touched the floor. It is a failure:
a) not to make a full turn to the right.
b) to move feet after they have returned to the floor.
c) to lose the balance.

STUNT #7 (Brace) Stork-stand test. Stand on left foot. Hold the bottom of right foot against the medial side of the left knee. Place hands on hips. Shut eyes, and hold the position for ten seconds, without moving left foot. It is a failure:
a) to lose the balance.
b) not to hold right foot against left knee.
c) to open eyes, or to remove hands from hips.

STUNT #8 (Brace) Hop-backward test. Stand on either foot. Close eyes, and take five hops backward. Failure:
a) to open eyes.
b) to touch the floor with foot not supporting the weight of body.

STUNT #9 (Brace-Iowa) Half-turn-jump-left-foot test. Stand on left foot, and jumping, make a one-half turn to the left. Keep the balance. It is a failure:
a) to lose the balance.
b) to fail to complete the half turn.
c) to touch the floor with right foot.

STUNT #10 (Brace-Iowa) Stiff-leg-bend test. Place a paper on the floor near left heel. Stand with lower legs completely extended, bend trunk forward, grasp right toes with right fingers, and pick up the paper with left fingers. At no time must lower legs be allowed to bend. It is a failure:
a) not to pick up the paper.
b) to release the hold of right toes.
c) to bend legs at knees.

APPENDIX I

Our school is interested in the possibility of participating in the research to be conducted during the 1969-1970 school year.

Send further information to:

Name & position_____ _____

Name of School_____

School Adress_____

_____

Zip

School District_____

County_____

APPENDIX I-1

MILLERSVILLE STATE COLLEGE
MILLERSVILLE, PENNSYLVANIA 17551

Dear Mr.

After consulting the Department of Public Instruction, Bureau of Special Education, your school has been selected as a possible participant in a state wide research project. The project is a comparison of educable mentally retarded with normal students on certain specific factors related to driving ability. (Refer to enclosed description of project.) The students tested will be representative of the secondary school population of Pennsylvania.

We are most interested in obtaining your cooperation in providing a portion of the sample population from your school. The results of this study will be made available to you, your Special Education, and Driver Education Departments. It is anticipated that this study will help the students in your school by providing you with more specific data pertaining to their driving abilities.

One has but to look at our over-crowded highways, the number of accidents, and the rising death roll by automobile to see the magnitude of the driving problem. Is an educable mentally retarded student at a disadvantage when he is driving? Is he alert and aware of hazardous situations? Is he a danger to himself and others? This study hopes to find answers to these questions.

The importance of a study such as this is self-evident in that it has been supported and funded by the United States Office of Education. Also, it has been endorsed by Dr. William Ohrtman, Director of the Bureau of Special Education; Harry H. Brainard, Commissioner of Traffic Safety; and Ray M. Fulmer, Coordinator of Highway Safety Education.

It will be greatly appreciated if you will kindly complete the enclosed card and mail it at your earliest convenience.

Thank you for your attention concerning this matter.

Sincerely,

172

James F. Bologa

James F. Bologa
Co-Principal Investigator

JFB:psb
enclosure

APPENDIX J

MILLERSVILLE STATE COLLEGE
MILLERSVILLE, PENNSYLVANIA 17551

Dear

Millersville State College has been granted funds by the United States Office of Education to conduct a comparison study of educable mentally retarded and intellectually normal adolescent drivers. The subjects will be representative of the secondary school population in Pennsylvania. Perhaps the article pertaining to the study, which appeared in the January P.S.E.A. Journal, came to your attention. An abstract is enclosed to further inform you of the objectives and methodology of the research.

Because of the significance and applicability of this study, we hope to enlist your support in obtaining data on students in the schools of your jurisdiction. Collection of data by the investigators, which is scheduled for the 1969-1970 school year, will require a minimum amount of time at each of the participating schools. Only those schools having senior high classes for the educable mentally retarded would be involved, since an equal number of the "normal" population could, in most cases, be sampled at the same school. It is anticipated that testing would not involve more than twenty students from any one school.

We are currently informing the senior high school principals of the project through direct correspondence. We are confident that your support of this study will be reflected in their cooperation.

Sincerely,

Darryl J. Strickler

Darryl J. Strickler
Co-Principal Investigator

DJS:psb
enclosure

173

APPENDIX J-1

MILLERSVILLE STATE COLLEGE
MILLERSVILLE, PENNSYLVANIA 17551

Dear

This is to inform you of research being conducted by Millersville State College which deserves your attention. The project, funded by the United States Office of Education, Bureau of Research, primarily involves a comparison of normal and educable mentally retarded drivers to be selected from the public secondary school population of Pennsylvania. (Please refer to the enclosed abstract for a more complete description of the research.)

The data resulting from the study may have application to the improvement of highway safety in Pennsylvania.

Because of the significance of this study, the Bureau of Special Education has given it its full support. I urge you to enlist the co-operation of your district in making this study a success.

Very truly yours,

William F. Ohrtman

William F. Ohrtman
Director,
Bureau of Special Education
Harrisburg, Pennsylvania

Enc.

174

APPENDIX J-2

DESCRIPTION OF THE PROJECT

TITLE: The Measurement and Comparison of Variables Related to Driver and Highway Safety Between Educable Mentally Retarded and Normal High School Age Pupils in Pennsylvania.

FUNDED BY: United States Office of Education, Grant #OE6-0-9-482062-1362-(032)

TIME: Work on the study began in January of 1969 and will continue through January of 1971.

The above project is being sponsored by Millersville State College under the direction of Dr. W. Richard Kettering of the Special Education Department and Professor Raymond C. Mullin of the Driver Education Department.

The purpose of this study is to measure and compare the variables related to driving safety and to designate factors which can predict the success of educable mentally retarded students in contrast to students with normal intelligence when operating motor vehicles.

In conducting the study, a stratified random sample will be employed to select eight hundred public high school students throughout Pennsylvania. Four hundred educable mentally retarded and four hundred intellectually normal students will be studied. The students will be in the sixteen to eighteen chronological age range. They will be tested and the test results analyzed, based on the objectives of the study which include the following factors: visual acuity, visual organization, field of vision, depth perception, eye-hand coordination, intelligence, emotional maturity and excitability, reaction time, situational stress and attitudes toward driving.

Also, the driving records of all students involved will be checked in Harrisburg and their records will then be compared to their performance on the tests. The results of student performance on the tests and their driving records will then be analyzed by computer to show the differences between the groups. It is anticipated that these results will aid the Commonwealth of Pennsylvania and other states in the future licensing of drivers. Also, the findings will aid in the formulation of driver education programs for the educable mentally retarded and be used in developing teacher training programs.

APPENDIX K

1. Approximate number of Special Education students with driver's licenses who will be in attendance during the 1969-70 school year (include probable future licensees)._____

   a) Number who will have had standard Driver Education Course_____

   b) Number who will not have had the Driver Education Course_____

2. Will it be possible to sample an equal number of "normal" and Special Education (EMR) students from your school?_____

_____

Name and Position_____ _____

Name of School_____

School Adress_____

_____ Zip Code _____

Phone_____

APPENDIX K-1

MILLERSVILLE STATE COLLEGE
MILLERSVILLE, PENNSYLVANIA 17551

Dear

Thank you for your prompt response to our letter of January 27, concerning the comparison study of educable mentally retarded (EMR) and intellectually normal drivers. The number of returns received from our first mail-out is most gratifying. We feel this illustrates the importance of this type of research to Pennsylvania Educators.

We are interested in visiting your school and gathering data on the following two groups of licensed drivers:

1. Special Education Students (EMR)
   a) Licensed drivers who have completed the standard Driver Education Program.
   b) Licensed drivers who have not had Driver Education.

2. Normal Students (Any student not in Special Education)
   a) Licensed drivers who have completed the standard Driver Education Program.
   b) Licensed drivers who have not had Driver Education.

We hope to be able to sample an equal number of Special Education (EMR) and "normal" students at each school. The two groups of students are to be matched on the basis of sex, chronological age, and whether the student has completed driver education or not. The number of possible participants from any school will depend upon the number of Special Education students in that school who have driver licenses at the time of our visit. We estimate that our research will not involve more than fifteen Special Education students and an equal number of normal students from any one school.

Administration of the battery of tests by the investigators will require approximately three to four hours at each participating school. The testing will include an assessment of visual acuity, psycho-motor ability, perception, reaction time, temperment and attitude driving. In terms of physical requirements, one room will be adequate in most cases. Other than selecting students who will participate, no demands will be made upon the time of your school personnel.

We are confident of your continued interest in this project and sincerely hope that you will be able to participate in the research. With your cooperation, we hope to arrange an exact date for testing at your school through subsequent correspondence.

So that we will have more specific information regarding the number of possible participants from your school, we respectfully request that you fill out and return the enclosed card at your earliest convenience.

Thank you very much for your consideration and cooperation.

Most Sincerely,

James F. Bologa
Darryl J. Strickler
Co-Principal Investigators

JFB/DJS:psb
Enclosure

APPENDIX L

DRIVER EDUCATION RESEARCH PROJECT
MILLERSVILLE STATE COLLEGE
MILLERSVILLE, PENNSYLVANIA, 17551

INSTRUCTION FOR SELECTING STUDENT PARTICIPANTS

General:

1. Please select only students who are licensed drivers.
2. Match Normal students to the Special Education students on the basis of age, sex, driver training experience, and accident record.
3. Include all Special Education students who are licensed drivers, regardless of whether they have received driver training or not.

Please complete the enclosed form as follows:

1. Begin by listing information on the Special Education students in the left column.
2. Next, select regular class students from any of the various school programs and match them with the Special Education student in the left column. Record information on the "normal" students in the right column.
3. The information on the pupils in the left and right columns should be essentially the same, except for the name. For example, a Special Education girl who is 17 years, 3 months old, has had the standard driver education program and has had no accident while driving, is matched with a "normal" girl who is about the same age, has had the driver education program and has also had no accidents.

The information should be recorded as follows:

SPECIAL EDUCATION STUDENTS (EMR)						REGULAR CLASS STUDENTS (NORMAL)					
Name	Sex	Age	Std. (Driver Training)	Class	None Acc.	Name	Sex	Age	Std. (Driver Training	Class	None Acc.
1.	F	17-3	X		No	1.	F	17-1	X		No

4. Treat the heading "Driver Training" as follows:
   a) If the student has completed the standard driver education program of 30 hours of classroom instruction, and 6 hours behind-the-wheel training, place an X in the column under "STD".
   b) If he has completed the classroom portion only, place an "X" in the "Class" column.
   c) If he has had no driver training, place an "X" under "None".

5. In the column "Acc." place Yes/No to indicate if the student was involved in <u>any accident</u> (reportable or unreportable).

To insure current information on student participants it is suggested that you complete the enclosed selection form approximately two weeks prior to the date of testing. It will be greatly appreciated if you will give the completed form to the investigators at the time of testing.

APPENDIX L-1

School: _____ Region: _____ Testing Date: _____ Sample: Total:____ EMR:___N:____

SPECIAL EDUCATION STUDENTS (EMR)									REGULAR CLASS STUDENTS (NORMAL)								
			DRIVER TRAINING									DRIVER TRAINING				
Name	Sex	Age	Std.	Class	None	Acc.			Name	Sex	Age	Std.	Class	None	Acc.	
1.									1.							
2.									2.							
3.									3.							
4.									4.							
5.									5.							
6.									6.							
7.									7.							
8.									8.							
9.									9.							
10.									10.							
11.									11.							
12.									12.							
13.									13.							
14.									14.							
15.									15.							
16.									16.							
17.									17.							
18.									18.							
19.									19.							
20.									20.							

DRIVER EDUCATION RESEARCH PROJECT

MILLERSVILLE STATE COLLEGE

Personal Information

1. Name: _____ Sex: ☐

   Home Address: _____

   _____ _____ zip

2. Where do you live? City:___ Suburbs:___ Town:___ Rural (Not a farm):___ Farm:___

3. Today's Date: _____ ____ ____ month day year

   Your Birthday: _____ ____ ____ month day year

4. Height: _____ Weight: _____

5. Do you wear glasses (Or contact lenses) when you drive? yes ☐ no ☐

6. Are you right-handed ☐ or, left-handed? ☐

7. What is your father's (or guardian's) job? _____

   _____

Driving Information

8. Copy the following information from the upper left corner of your drivers license:

   Operator Number ☐

   Restriction ☐

9. Approximate number of miles you drive a year (check one)
   less than 2000___ 2000-4000 ___ 4000-6000 ___
   6000-8000 ___ 8000-10,000___ over 10,000___

10. Today's Date: _____ ____ ____ month day year

    Date you got your license: _____ ____ ____ month day year

School Information

11. Name of school: _____

    School District: _____

    County: _____ ☐

12. Class: Freshman: ____ Sophomore:___ Junior: ____ Senior: ___

13. School Program: (Check one) College Prep.:___ General: ___ Special Ed.: ___ Academic:___ Commercial: ___ Other: ___ ☐

Driver Education Information

14. I did not have any course in Driver Education: ☐

15. I took Driver Education; Both behind-the-wheel and classroom instruction: ☐
    a. behind-the-wheel training only: ___.
    b. Classroom instruction only: ___

Accident and Violation Information

16. Have you had any accidents while you were driving a car? (Check one) Yes ☐ No ☐
    If yes, please explain: _____

    _____

    _____

    _____

    _____

17. Have you ever been arrested for any traffic violations? (Check one) Yes ☐ No ☐
    If yes, list violations: _____

    _____

    _____

    _____

    _____

APPENDIX N

SCHOOLS REPRESENTED IN STUDY
(57 Public High Schools)

REGION I

	School	District	County	Enrollment
1.	Connellsville Area Senior High Locust Street Extension Connellsville 15425	Connellsville Area	Fayette	1788
2.	Junior High West, I.A. Bldg. 215 Falls Avenue Connellsville 15425	(County Operated)	Fayette	86
3.	North Laurel Highland Jr. Sr.High 490 Coolspring Street Uniontown 15401	Laurel Highlands	Fayette	1424
4.	Fayette Institute of Commerce and Technology 45 West Kerr Street Uniontown 15401	(County Operated)	Fayette	81
5.	Uniontown Area Senior High Fayette Street Uniontown 15401	Uniontown Area	Fayette	1387
6.	Moon Senior High 904 Beaver Grade Road Coraopolis 15108	Moon Schools	Allegheny	1030
7.	Western Hills School 1720 Hassam Road Coraopolis 15108	(County Operated)	Allegheny	163
8.	Butler Area Senior High 165 New Castle Road Butler 16001	Butler Area	Butler	3018
9.	Shannock Valley Jr. Sr.High Rural Valley 16249	Armstrong	Armstrong	490
10.	Leechburg Area Jr. Sr.High Leechburg 15656	Leechburg Area	Armstrong	830
11.	Norwin Sr. High McMohon Drive Irwin 15642	Norwin	Westmore-land	1969

REGION II

*12.	Erie County Vo. Tech. Erie 16500	(County Operated	Erie	
	a) Corry Area Sr. High 534 East Pleasant St. Corry 16407	Corry Area Jt.	Erie	870
	b) Ft. LeBoeuf Jr. Sr.High Waterford 16441	Ft. LeBoeuf	Erie	1155
	c) Rice Union High Girard 16417	Girard Union	Erie	850
	d) Harbor Creek Jr.Sr.High 6375 Buffalo Road Harbor Creek 16421	Harbor Creek	Erie	1630
	e) McDowell Sr.High 3580 W. 38th St. Erie 16506	Millcreek Twp.	Erie	2100
	f) Northwestern Jr. Sr.High Albion 16401	Northwestern	Erie	1124
	g) Union City, Concord Union City 16438	Union City Area	Erie	350
13.	East Brady Jr. Sr. High East Brady 16028	Armstrong	Clarion	510
14.	Punxsutawney Area Jr. Sr.High North Findley Street Punxsutawney 15767	Punx'ey Area	Jefferson	2380

REGION III

15.	Johnstown Central High 331 Somerset Street Johnstown 15905	Greater Johnstown	Cambria	1704
16.	Windber Area Jr. Sr.High Graham Avenue Windber 15963	Windber Area	Somerset	1241
17.	Jenner-Boswell Jr. Sr.High 400 Ohio Street Boswell 15531	North Star	Somerset	781

REGION IV

18.	Juniata Sr. High Main Street Mifflintown 17059	Juniata County	Juniata	555

19.	Phillipsburg-Osceola Sr.High Curtis Park Phillipsburg 16866	Phillipsburg- Osceola Area	Clearfield	748
20.	Clearfield Area Sr.High Mill Road Clearfield 16830	Clearfield Area	Clearfield	1114
21.	Southern Columbia Area Jr.Sr.High R. D. #2 Catawissa 17820	Southern Columbia	Columbia	795
REGION V				
22.	Tunkhannock Jr. Sr.High Tunkhannock 18657	Tunkhannock Area	Wyoming	1140
*23.	Wallenpaupack Area Jr. Sr.High Hawley 18428	Wallenpaupack Area	Wayne	800
	a) J. J. Koehler School Honesdale 18431	(County Operated)	Wayne	28
	b) Waymart Sr. High Waymart 18472	Western Wayne Jt.	Wayne	200
REGION VI				
24.	Wilson Sr. High Grandview Blvd. West Lawn 19609	Wilson	Berks	1050
25.	Easton Area Sr. High 25th Street Easton 18042	Easton Area Jt.	Northampton	2117
26.	Boyertown Sr. High 4th and Monroe Streets Boyertown 19512	Boyertown	Berks	1815
*27.	Central Building 15th and Main Streets Northampton 18067	(County Operated)	Northampton	30
	a) Leibert's School Schoeneck Ave.,R.D. #3 Nazareth 18064	(County Operated)	Northampton	69

REGION VII

28.	William Tennent Sr.High 2201 Street Road Warminster 18974	Centennial	Bucks	1946
29.	Coatesville Area Sr. High 1545 East Lincoln Hwy. Coatesville 19320	Coatesville Area	Chester	1120
30.	Penncrest Sr. High Media 19063	Rose Tree-Media	Delaware	1735
31.	Upper Darby Sr.High Lansdowne Avenue & School Lane Upper Darby 19084	Upper Darby	Delaware	2511
32.	Council Rock Sr.High Green Lane Newtown 18940	Council Rock	Bucks	1252
33.	Souderton Area Sr.High 41 N. School Lane Souderton 18964	Souderton Area	Montgomery	1140
34.	Methacton Sr. High Fairview Village 19403	Methacton	Montgomery	1218
35.	E. S. Miller School 43rd & Westminster Streets Philadelphia 19104	Philadelphia	Philadelphia	328
36.	Pottstown Sr. High North Washington St. Pottstown 19464	Pottstown	Montgomery	1080
37.	Morrisville Boro Jr. Sr.High W. Palmer St. Morrisville 19067	Morrisville Boro	Bucks	735
38.	Henderson Sr. High Lincoln & Montgomery Aves. West Chester 19380	West Chester Area	Chester	2100

REGION VIII

39.	Northern Lebanon Jr. Sr.High Fredericksburg 17038	Northern Lebanon	Lebanon	1298
40.	Garden Spot Jr. Sr.High Rt. 23 & Tower Road New Holland 17557	Eastern Lanc. Co.	Lancaster	1632

41.	Manheim Central Sr. High Adele Avenue Manheim 17545	Manheim Central	Lancaster	780
42.	Lebanon Sr. High 1000 S. Eight St. Lebanon 17042	Lebanon	Lebanon	1625
43.	Solanco Sr. High R. D. #2 Quarryville 17566	Solanco	Lancaster	989
*44.	Cedar Cliff High School Carlisle & Warwick Rds. Camp Hill 17011 a) Red Land High School R. D. #1 Etters 17319	West Shore	Cumberland	1622
*45.	John Harris Sr. High Market Street Harrisburg 17105 a) William Penn Sr. High 2915 N. Third St. Harrisburg 17105	Harrisburg	Dauphin	1485

*Indicates testing locations for students from schools which follow a, b, etc.

APPENDIX O

I. Correlation Matrices

II. Correlation Matrices Tables:

Appendix 01 Correlation Matrix of Relationships Between Variables 20 Through 51 for the Total EMR Group and Variables 20 Through 51 for the Total Normal Group

Appendix 02 Correlation Matrix of Relationships Between Variables 20 Through 51 for the Female EMR Group and Variables 20 Through 51 for the Female Normal Group

Appendix 03 Correlation Matrix of Relationships Between Variables 20 Through 51 for the Male EMR Group and Variables 20 Through 51 for the Male Normal Group

Appendix 04 Correlation Matrix of Relationships Between Variables 70 Through 100 for the Total EMR Group and Variables 70 Through 100 for the Total Normal Group

Appendix 05 Correlation Matrix of Relationships Between Variables 70 Through 100 for the Female EMR Group and Variables 70 Through 100 for the Female Normal Group

Appendix 06 Correlation Matrix of Relationships Between Variables 70 Through 100 for the Male EMR Group and Variables 70 Through 100 for the Male Normal Group

Appendix 07 Correlation Matrix of Relationship For Variables 20 Through 51 With Variables 68 Through 100 With Total EMR

Appendix 08 Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 With Total Normal

Appendix 09 Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 With Normal Female

Appendix 010 Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 With EMR Female

Appendix 011 Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 for EMR Male

Appendix 012 Correlation Matrix of Relationship for Variables 20 Through 51 With Variables 68 Through 100 for Normal Male

APPENDIX O-1

CORRELATION MATRIX OF RELATIONSHIPS BETWEEN VARIABLES
20 THROUGH 51 FOR THE TOTAL EMR GROUP AND VARIABLES 20 THROUGH 51 FOR THE TOTAL NORMAL GROUP

TOTAL NORMAL GROUP
r = .094 at .05 level

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
20		.519	.572	.347	.347	-.266	.092	.065	.160	.107	.013	.015	.051	.063	.092	.070	-.093	-.086	.018	-.093	-.101	-.063	.018	.009	-.028	-.021	-.013	-.007	-.003	-.055	-.047	.004
21	.589		.668	.345	-.327	-.267	-.039	.049	.031	.039	.020	.034	.056	.061	.078	.036	-.047	-.049	-.021	-.005	-.069	-.046	.012	.021	-.005	-.013	-.019	-.021	-.043	-.008	.001	.012
22	.719	.701		.371	-.353	-.286	.023	.047	.021	.031	.056	.087	.107	.046	.058	.018	.039	.043	.025	.034	.025	-.019	-.018	-.005	.013	-.012	-.002	-.003	.051	.029	.047	.042
23	.386	.464	.436		-.855	-.853	-.005	-.020	.002	-.015	-.017	.007	.046	.019	.094	.116	-.066	-.070	-.030	-.096	-.125	-.117	-.067	-.066	.016	.018	-.025	-.067	.010	-.085	.078	.003
24	.344	-.381	-.355	-.833		.468	-.022	-.008	.001	-.001	.004	-.025	-.064	-.036	-.097	-.105	.062	.068	.062	.066	.096	.123	.002	.020	.030	-.053	.009	.063	.025	.040	.052	.040
25	-.328	-.421	-.394	-.827	.416		.031	.037	-.015	.015	.009	-.001	-.020	-.009	-.079	-.109	.049	.047	-.033	.093	.109	.072	.105	.085	-.054	.011	.041	.050	-.050	.095	.069	-.053
26	-.049	.091	.022	.042	.011	-.086		.045	.075	.066	-.056	-.086	-.111	-.036	-.049	-.043	.063	.058	-.008	-.032	-.024	.029	.082	-.010	-.141	-.060	-.048	-.002	-.095	.034	-.006	-.100
27	.076	.287	.127	.145	-.130	-.120	.044		.685	.904	.038	.045	.065	.076	.048	.004	.016	.018	-.008	.051	.046	.025	.010	-.007	-.057	.032	.034	.024	.013	.048	.040	-.007
28	.152	.179	.180	.113	-.099	-.104	.053	.535		.917	-.001	.016	.060	-.018	.014	.020	-.061	-.055	-.003	.003	-.010	-.028	.013	-.001	-.035	.097	.104	.044	.016	-.011	-.012	.007
29	.108	.255	.147	.134	-.098	-.136	.045	.864	.730		.021	.035	.070	.031	.038	.019	-.027	-.022	-.002	.038	.028	-.001	.014	.000	-.047	.077	.082	.038	.024	.023	.021	.005
30	.080	.083	.075	.043	-.004	-.064	.043	.148	.216	.142		.901	.357	.281	.380	.312	.251	.262	.109	.252	.260	-.001	.152	.238	.090	.194	.177	.025	.269	.385	.449	.209
31	.100	.118	.100	.148	-.120	-.135	.054	.191	.282	.188	.711		.697	.199	.372	.397	.223	.236	.118	.230	.245	.074	.126	.233	.134	.168	.169	.044	.407	.336	.440	.317
32	.058	.091	.077	.184	-.171	-.159	.032	.116	.164	.129	.057	.666		.026	.246	.403	.039	.051	.063	.071	.083	.024	.114	.135	.058	.061	.025	.422	.093	.210	.338	
33	.037	.086	.079	.017	-.014	.004	-.024	.057	.090	.028	.245	-.009	.208	.045	.799	.133	.219	.213	-.024	.286	.241	-.248	.168	.192	-.051	.175	.100	-.064	-.035	.432	.391	-.083	
34	.127	.083	.154	.172	-.123	-.148	-.056	.147	.238	.131	.283	.443	.290	.600		.658	.142	.148	.043	.224	.204	-.165	.116	.186	.043	.148	.103	-.015	.208	.339	.404	.196	
35	.148	.050	.147	.209	-.141	-.200	-.067	.133	.217	.150	.177	.401	.393	.070	.760		.002	.023	.143	.033	.062	.083	-.006	.084	.137	.036	.035	.030	.424	.064	.223	.439	
36	.009	.049	.062	.112	-.120	-.087	.048	.027	.102	.013	.235	.241	.058	.279	.172	.041		.993	.092	.523	.531	.124	.315	.348	-.039	.265	.257	.031	.086	.786	.775	.057	
37	.003	.046	.063	.121	-.131	-.090	.055	.032	.110	.017	.221	.259	.091	.247	.162	.061	.989		.189	.524	.542	.160	.308	.358	-.008	.262	.265	.045	.138	.781	.790	.108	
38	-.039	-.050	-.043	-.033	-.035	.005	.029	.012	.095	.040	.005	.155	.170	-.112	-.058	.053	.200	.289		.032	.121	.340	.014	.131	.198	-.031	.047	.091	.423	.066	.197	.361	
39	-.032	-.002	.003	-.012	-.016	.028	.035	.015	.095	-.001	.182	.115	-.078	.370	.200	-.016	.617	.601	.132		.968	.059	.238	.295	.015	.368	.361	.077	.085	.754	.752	.057	
40	-.016	.003	.029	.047	-.065	-.024	.017	.004	.094	-.018	.175	.191	.042	.333	.279	.108	.631	.632	.189	.912		.275	.216	.320	.101	.328	.355	.115	.176	.730	.778	.190	
41	.034	.013	.056	.131	-.121	-.105	-.037	-.009	.033	-.010	.014	.212	.276	-.034	.228	.310	.103	.143	.172	-.044	.356		-.032	.126	.279	-.061	.049	.135	.366	.024	.198	.484	
42	.014	.059	.040	.072	-.074	-.033	.039	.124	.250	.162	.187	.182	.024	.233	.204	.126	.355	.347	.022	.311	.294	.010		.843	-.501	.450	.225	-.233	-.238	.671	.515	-.357	
43	.030	.069	.039	.115	-.087	-.092	.029	.101	.240	.148	.215	.279	.102	.245	.286	.197	.382	.385	.079	.336	.335	.054	.890		.018	.439	.362	-.020	.052	.657	.662	.063	
44	.048	-.001	.005	.045	-.001	-.090	-.029	-.105	-.105	-.099	-.028	.106	.124	-.057	.088	.099	-.021	.000	.117	-.039	-.003	.075	-.466	-.039		-.161	.123	.375	.539	-.212	.075	.745	
45	.070	.101	.047	.082	-.084	-.060	.061	.065	.213	.103	.155	.094	-.031	.197	.199	.127	.290	.288	.036	.325	.287	-.020	.496	.489	-.169		.736	-.120	-.089	.520	.455	-.115	
46	.044	.053	.037	.082	-.051	-.097	-.058	.035	.121	.035	.095	.176	.125	.234	.299	.228	.300	.310	.061	.315	.359	.163	.330	.404	.053	.626		.560	.188	.397	.454	.194	
47	-.013	-.043	-.023	.033	.003	-.062	-.109	-.037	-.056	-.063	-.051	.120	.191	.049	.173	.189	.042	.066	.062	.035	.139	.247	-.105	.010	.270	-.137	.631		.379	-.065	.096	.427	
48	.021	.031	.048	.151	-.093	-.162	-.002	.040	.031	.002	.152	.405	.405	.138	.357	.349	.232	.282	.231	.299	.381	.237	-.037	.199	.504	.001	.325	.440		-.011	.236	.665	
49	.016	.073	.066	.087	-.097	-.050	.049	.090	.215	.093	.345	.297	.014	.508	.341	.096	.817	.799	.115	.760	.725	.030	.734	.710	-.235	.526	.434	-.023	.199		.931	-.089	
50	.041	.072	.067	.154	-.142	-.122	.022	.093	.232	.093	.333	.432	.197	.431	.485	.308	.825	.832	.216	.719	.781	.255	.619	.713	.013	.466	.520	.159	.423	.926		.270	
51	.071	-.001	.053	.163	-.125	-.167	-.054	.028	.080	.031	-.005	.377	.481	-.136	.411	.571	.135	.196	.332	.001	.244	.590	-.191	.102	.613	-.052	.302	.500	.610	-.052	.318	

TOTAL EMR GROUP
r = .107 at .05 level

APPENDIX O-2
CORRELATION MATRIX OF RELATIONSHIPS BETWEEN VARIABLES
20 THROUGH 51 FOR THE FEMALE EMR GROUP AND VARIABLES 20 THROUGH 51 FOR THE FEMALE NORMAL GROUP

FEMALE NORMAL GROUP
r = .138 at .05 level

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
20		.453	.537	.303	-.331	-.208	.146	.087	.124	.101	-.003	.035	.090	-.028	.037	.065	.008	.027	.055	.078	.086	.005	.045	.071	.040	.005	.067	.107	.049	.049	.092	.082
21	.534		.643	.318	-.298	-.239	-.064	.053	.083	.062	-.014	.021	.063	-.039	-.002	.030	-.094	-.092	-.027	.006	.026	.096	-.034	.010	.068	-.071	-.011	.085	.025	-.056	-.016	.064
22	.654	.801		.344	-.339	-.250	.034	.026	.071	.039	.060	.096	.107	-.032	.001	.013	.066	.067	-.053	.098	.100	.009	-.046	-.004	.090	-.058	.001	.076	.052	.037	.078	.089
23	.529	.594	.488		-.846	-.848	.007	-.068	.000	-.049	-.045	-.008	.015	-.045	.083	.135	-.063	-.068	-.048	-.080	-.077	.007	-.102	-.071	.081	.080	.081	-.007	.089	-.095	-.052	.066
24	-.522	-.539	-.476	-.869		.448	-.046	.030	-.013	.015	.062	.013	-.042	.002	-.082	-.103	.053	.053	.075	.026	.028	.032	.029	.010	-.038	-.105	-.095	.036	-.037	.033	.020	-.005
25	-.397	-.509	-.373	-.875	.529		.032	.075	-.011	.044	-.008	-.023	-.000	.062	-.080	-.148	.045	.044	-.026	.080	.074	-.033	.128	.091	-.101	-.065	-.077	-.027	-.119	.101	.035	-.123
26	-.031	.211	.138	.142	-.145	-.101		.060	.118	.093	-.070	-.112	-.139	-.055	-.066	-.047	.058	.050	-.020	-.099	-.095	.031	.125	-.032	-.271	-.110	-.109	-.031	-.159	.018	-.053	-.167
27	.025	.403	.222	.117	-.093	-.111	.094		.755	-.927	.082	.051	.024	.055	.011	-.034	.074	.087	.039	.083	.094	.021	.077	.036	-.128	.062	.088	.070	.016	.111	.094	-.025
28	.076	.443	.304	.233	-.220	-.191	.191	.783		.916	.120	.118	.106	-.062	-.001	.056	.029	.051	.090	.112	.124	.021	.070	.039	-.067	.157	.189	.101	.057	.098	.110	.044
29	.043	.437	.261	.162	-.141	-.144	.132	.978	.897		.110	.092	.071	.003	.017	.020	.051	.070	.075	.122	.135	.027	.083	.049	-.101	.126	.157	.093	.055	.121	.121	.016
30	.115	-.007	-.068	.115	-.133	-.048	.242	.162	.027	.125		.909	.419	.297	.423	.338	.313	.331	.118	.348	.365	.098	.085	.212	.127	.231	.247	.099	.333	.435	.529	.284
31	.050	-.002	-.134	.036	-.111	.047	.308	.172	.201	.190	.576		.737	.224	.452	.453	.258	.279	.118	.297	.326	.179	.008	.164	.200	.187	.209	.101	.465	.336	.491	.414
32	-.095	-.025	-.118	-.071	-.006	.103	.094	.043	.199	.098	-.163	.621		.049	.338	.473	.073	.093	.083	.128	.164	.218	-.087	.052	.225	.072	.109	.093	.481	.079	.269	.471
33	-.161	-.065	-.179	.047	-.184	.106	-.069	-.101	-.132	-.117	.100	.090	-.073		.742	.106	.406	.405	.054	.369	.342	-.179	.218	.258	-.056	.199	.136	-.099	-.074	.576	.533	-.037
34	.095	.015	-.062	.133	-.097	-.143	-.157	.044	.127	.074	.154	.400	.297	.265		.716	.294	.314	.152	.375	.376	.007	.091	.203	.099	.223	.185	-.005	.262	.458	.567	.304
35	.225	.074	.095	.111	.023	-.234	-.159	.099	.199	.138	.001	.308	.402	-.257	.777		.037	.068	.177	.168	.196	.187	-.067	.065	.214	.120	.117	.060	.474	.105	.317	.515
36	.165	.097	.253	.449	-.467	-.334	.117	-.139	.007	-.096	.161	.135	.098	.226	.110	.103		.990	.092	.398	.388	-.059	.294	.331	-.065	.185	.214	.063	.080	.758	.718	-.002
37	.179	.114	.266	.462	-.465	-.356	.130	-.131	.011	-.090	.168	.153	.111	.213	.137	.142	.996		.201	.411	.406	-.021	.290	.343	-.035	.194	.225	.071	.131	.764	.743	.048
38	.252	.254	.229	.256	-.138	-.294	.100	-.010	-.003	-.008	.095	.212	.150	-.060	.357	.468	.182	.261		.042	.070	.204	.095	.172	.129	-.007	.006	.023	.321	.130	.217	.229
39	.046	.105	.085	.186	.191	-.159	.058	-.075	.018	-.048	.177	.127	.100	.207	.011	-.015	.501	.485	-.102		.988	-.068	.157	.264	.121	.228	.264	.110	.133	.703	.731	.119
40	.093	.073	.128	.236	-.243	-.190	.018	-.103	.006	-.071	.031	.106	.197	.177	.064	.083	.546	.536	.004	.906		.074	.136	.266	.163	.208	.254	.125	.190	.684	.740	.185
41	.042	-.074	.077	.114	-.123	-.072	-.061	-.043	.057	-.011	-.200	.016	.226	-.076	.158	.277	.227	.233	.183	.150	.525		.165	-.000	.315	-.155	-.077	.114	.411	-.134	.056	.451
42	.026	.053	.151	.119	-.207	.000	.166	.094	.208	.137	.055	-.041	-.071	.186	-.060	-.102	.330	.299	-.293	.171	.151	.910		.863	-.566	.374	.203	-.255	-.257	.649	.448	-.424
43	.061	.015	.096	.208	-.239	-.127	.153	-.026	.087	.011	.101	.083	.002	.180	.133	.045	.399	.382	-.122	.171	.183	.077	.885		-.102	.396	.286	-.149	.017	.671	.621	-.073
44	.036	-.088	-.166	.084	.055	-.206	-.081	-.233	-.286	-.263	-.004	.214	.189	-.091	.363	.297	.008	.039	.388	-.088	-.010	.155	.526	-.088		-.131	.021	.228	.534	-.211	.081	.662
45	.179	.109	.198	.118	-.165	-.050	.140	.096	.226	.145	.140	.090	.077	.091	.171	.169	.229	.228	.020	.305	.332	.195	.611	.510	-.430		.851	-.021	-.052	.436	.403	-.019
46	.158	-.030	.066	.091	-.055	-.100	-.253	-.050	.015	-.031	.175	.104	.065	.154	.350	.320	.200	.224	.333	.192	.270	.253	.261	.287	-.065	.717		.483	.126	.370	.406	.133
47	-.020	-.167	-.151	-.036	.137	-.065	-.355	-.168	-.172	-.178	.062	.129	.122	.047	.258	.263	-.033	.008	.483	-.137	-.037	.153	-.203	-.102	.281	.042	.675		.323	-.049	.080	.296
48	-.009	.005	-.113	.188	-.022	-.317	-.064	-.123	-.154	-.140	.077	.308	.420	-.077	.396	.474	.198	.244	.550	.190	.280	.261	-.323	-.028	.673	-.076	.311	.513		-.009	.251	.602
49	.099	.100	.193	.344	-.415	-.198	.159	-.045	.096	.001	.239	.138	.027	.404	.089	-.024	.817	.795	-.076	.664	.637	.142	.714	.692	-.295	.547	.339	-.133	-.006		.915	-.102
50	.173	.088	.203	.416	-.427	-.315	.103	-.101	.066	-.049	.200	.262	.205	.281	.315	.260	.875	.874	.182	.640	.714	.366	.513	.638	.041	.486	.436	.053	.306	.907		.291
51	.164	-.032	.035	.158	-.041	-.242	-.101	-.117	-.048	-.100	-.069	.312	.435	-.264	.539	.677	.198	.243	.597	-.014	.236	.591	-.345	-.008	.746	-.054	.278	.429	.728	-.111	.313	

FEMALE EMR GROUP
r = .273 at .05 level

APPENDIX O-3
CORRELATION MATRIX OF RELATIONSHIPS BETWEEN VARIABLES
20 THROUGH 51 FOR THE MALE EMR GROUP AND VARIABLES 20 THROUGH 51 FOR THE MALE NORMAL GROUP

MALE NORMAL GROUP
r = .125 at .05 level

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
20		.588	.612	.373	-.348	-.307	.000	.043	.159	.118	.009	-.026	-.015	.128	.118	.049	-.111	-.112	.000	-.181	-.197	-.062	-.000	-.017	-.044	-.018	-.034	-.044	-.028	-.088	-.101	-.039
21	.588		.690	.374	-.356	-.296	.000	.045	-.003	.020	.050	.048	.064	.117	.132	.045	-.031	-.035	-.018	-.024	-.048	-.097	.044	.026	-.054	.023	-.032	-.077	-.095	.016	.004	-.031
22	.725	.675		.397	-.366	-.321	.000	.071	-.017	.025	.051	.077	.107	.104	.100	.022	.029	.035	.093	-.011	-.030	-.028	.004	-.004	-.037	.026	-.002	-.046	.052	.028	.031	.003
23	.353	.434	.420		-.860	-.855	.000	.032	.005	.019	-.011	.002	.058	.060	.086	.078	-.010	-.014	-.003	-.050	-.102	-.143	-.037	-.041	.004	-.008	-.067	-.077	-.035	-.033	-.046	-.026
24	-.309	-.349	-.329	-.827		.478	.000	-.049	.010	-.018	-.029	-.044	-.070	-.059	-.094	-.088	.019	.028	.042	.044	.095	.142	-.022	.009	.049	-.034	.018	.057	.058	.005	.028	.057
25	-.310	-.400	-.393	-.817	.393		.000	-.005	-.020	-.015	.041	.037	-.022	-.058	-.064	-.053	-.001	-.003	-.051	.051	.084	.091	.084	.063	-.051	.053	.101	.073	-.009	.053	.051	-.014
26	-.042	.067	-.010	.012	.074	-.097		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
27	.068	.243	.079	.151	-.143	-.119	.025		.639	.884	-.007	.040	.119	.096	.083	.047	-.037	-.042	-.057	.022	-.000	.030	-.054	-.049	-.005	.003	-.017	-.007	.009	-.008	-.009	.010
28	.139	.096	.128	.073	-.066	-.074	-.026	.432		.925	-.093	-.063	.023	.010	.025	-.005	-.128	-.132	-.072	-.081	-.117	-.048	-.027	-.030	-.020	.055	.048	.016	-.013	-.087	-.101	-.023
29	.101	.186	.092	.117	-.081	-.127	.006	.799	.668		-.060	-.018	.073	.054	.056	.020	-.096	-.102	-.072	-.038	-.071	-.014	-.043	-.042	-.014	.035	.020	.006	-.004	-.057	-.066	-.009
30	.043	.072	.074	.018	.025	-.055	.001	.129	.227	.126		.893	.285	.270	.344	.274	.289	.297	.112	.262	.282	-.006	.210	.283	.095	.188	.167	.009	.237	.417	.477	.171
31	.066	.102	.102	.150	-.115	-.148	.015	.182	.268	.166	.715		.651	.180	.307	.331	.280	.292	.130	.262	.285	.081	.229	.316	.122	.177	.183	.038	.382	.406	.493	.259
32	.058	.091	.094	.225	-.198	-.201	.026	.124	.130	.117	.065	.667		.002	.163	.316	.077	.085	.064	.075	.077	.082	.132	.197	.101	.068	.062	.009	.396	.161	.236	.236
33	.068	.111	.122	.013	.012	-.011	-.012	.105	.135	.068	.268	.228	.001		.834	.150	.145	.136	-.075	.280	.228	-.282	.137	.158	-.041	.169	.093	-.043	-.003	.381	.346	-.111
34	.095	.062	.156	.167	-.120	-.139	-.018	.155	.230	.119	.268	.418	.269	.650		.616	.119	.120	-.021	.205	.184	-.200	.136	.198	.040	.122	.090	.002	.192	.328	.383	.146
35	.095	.009	.124	.214	-.161	-.184	-.014	.117	.184	.121	.163	.375	.368	.118	.750		.048	.065	.130	-.001	.046	.100	.048	.128	.125	-.005	.019	.045	.413	.093	.235	.411
36	.007	.063	.045	.056	-.059	-.050	.004	.112	.156	.076	.282	.305	.075	.292	.221	.070		.994	.065	.514	.523	.098	.351	.329	-.120	.279	.196	-.060	.044	.775	.775	.031
37	-.002	.056	.045	.064	-.073	-.048	.009	.118	.167	.081	.266	.327	.114	.256	.209	.089	.987		.164	.504	.529	.138	.341	.339	-.087	.267	.202	-.042	.102	.764	.785	.087
38	-.049	-.064	-.055	-.049	-.033	.020	.022	.024	.119	.060	.010	.171	.189	-.117	-.065	.046	.206	.301		-.013	.134	.412	-.048	.089	.232	-.063	.055	.117	.496	-.005	.164	.464
39	-.017	.003	.011	-.036	.008	.051	.013	.070	.144	.041	.217	.157	-.088	.398	.266	.024	.631	.615	.144		.946	.004	.315	.281	-.153	.445	.352	-.016	-.003	.759	.723	-.070
40	-.009	.012	.032	.022	.039	-.003	.002	.065	.146	.025	.230	.249	.036	.363	.351	.156	.641	.644	.203	.911		.286	.297	.326	-.040	.385	.340	.029	.121	.727	.765	.129
41	.028	.026	.048	.133	-.120	-.110	-.026	-.002	.023	-.015	.045	.243	.286	-.027	.241	.320	.082	.129	.182	-.078	.328		-.001	.144	.252	-.077	.028	.107	.374	-.004	.186	.536
42	.016	.063	.023	.065	-.051	-.041	-.012	.143	.267	.181	.214	.222	.046	.241	.245	.172	.361	.358	.042	.337	.321	.011		.836	-.480	.506	.244	-.236	-.229	.718	.595	-.314
43	.027	.079	.030	.101	-.064	-.088	-.013	.146	.276	.193	.234	.311	.121	.254	.310	.226	.384	.391	.091	.365	.364	.050	.892		.059	.456	.390	.013	.059	.641	.688	.143
44	.047	.012	.034	.036	-.010	-.068	-.008	-.071	-.070	-.058	-.036	.091	.110	-.052	.055	.065	-.024	-.004	.106	-.028	.001	.058	-.455	-.031		-.218	.132	.416	.536	-.300	-.005	.802
45	.051	.098	.018	.075	-.070	-.062	.038	.057	.213	.094	.158	.094	-.053	.212	.205	.122	.307	.305	.038	.334	.284	-.060	.477	.486	-.125		.650	-.203	-.138	.559	.471	-.219
46	.023	.069	.031	.081	-.050	-.096	.022	.067	.148	.056	.083	.193	.139	.247	.305	.220	.325	.333	.047	.342	.381	.144	.344	.425	.075	.611		.587	.206	.358	.427	.202
47	-.014	-.022	-.000	.045	-.021	-.061	-.011	.003	-.034	-.032	-.072	.119	.205	.050	.166	.179	.061	.081	.039	.070	.178	.266	-.086	.028	.267	-.169	.623		.404	-.139	.042	.496
48	.027	.037	.077	.146	-.106	-.139	.019	.093	.070	.042	.166	.432	.410	.167	.366	.344	.240	.292	.220	.318	.402	.234	.008	.231	.477	.013	.328	.429		-.056	.196	.710
49	.021	.084	.058	.050	-.047	-.032	.001	.154	.265	.142	.385	.353	.028	.526	.403	.144	.817	.799	.125	.774	.739	.011	.739	.716	-.224	.526	.454	-.001	.231		.935	-.145
50	.030	.078	.076	.115	-.098	-.094	-.011	.165	.281	.146	.367	.480	.207	.452	.530	.340	.821	.830	.221		.795	.237	.636	.724	.010	.465	.536	.178	.440	.929		.211
51	.039	-.009	.044	.158	-.137	-.148	-.031	.062	.093	.055	-.012	.378	.484	-.118	.393	.353	.137	.204	.334		.262	.591	-.164	.120	.591	-.053	.308	.514	.595	-.034	.325	

MALE EMR GROUP
r = .113 at .05 level

APPENDIX O-4
CORRELATION MATRIX OF RELATIONSHIPS BETWEEN VARIABLES
70 THROUGH 100 FOR THE TOTAL EMR GROUP AND VARIABLES 70 THROUGH 100 FOR THE TOTAL NORMAL GROUP

TOTAL NORMAL GROUP
r = .094 at .05 level

	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
70		-.647	.894	.740	-.044	-.145	-.004	-.041	-.041	-.041	-.041	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.069	.037	.056	.057	.062	.094
71	-.653		-.724	-.875	.029	.088	.003	.003	.003	.003	.003	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.049	.028	-.001	.011	-.031	-.009
72	.892	-.733		.587	-.040	-.110	.008	-.031	-.031	-.031	-.031	.058	.058	.058	.058	.058	.058	.058	.058	.058	.058	.058	.058	.058	.058	.101	.019	.059	.012	.046	.068
73	.731	-.894	.596		-.033	-.123	-.016	-.014	-.014	-.014	-.014	.070	.070	.070	.070	.070	.070	.070	.070	.070	.070	.070	.070	.070	.070	.014	-.007	-.002	.038	.047	.038
74	-.027	.036	-.069	.007		.040	-.038	-.005	-.005	-.005	-.005	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.014	.014	-.004	.079	-.005	.030
75	.073	-.112	.082	.100	-.010		-.050	-.029	-.029	-.029	-.029	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.024	-.055	-.020	-.039	-.016	.073	-.020
76	-.025	.000	.023	-.047	.004	-.052		.072	.072	.072	.072	-.038	-.038	-.038	-.038	-.038	-.038	-.038	-.038	-.038	-.038	-.038	-.038	-.038	-.038	.042	.069	.064	.019	-.029	-.036
77	-.222	.145	-.198	-.162	-.019	-.016	-.013		1.000	1.000	1.000	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	-.115	-.064	-.101	-.026	-.103	-.087
78	-.199	.119	-.175	-.137	-.020	-.017	.017	.952		1.000	1.000	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	-.115	-.064	-.101	-.026	-.103	-.087
79	-.222	.145	-.198	-.162	-.019	-.016	-.013	1.000	.952		1.000	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	-.115	-.064	-.101	-.026	-.103	-.087
80	-.222	.145	-.198	-.162	-.019	-.016	-.013	1.000	.952	1.000		.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	.498	-.115	-.064	-.101	-.026	-.103	-.087
81	-.039	-.001	-.019	-.017	-.109	.106	.067	.139	.167	.139	.139		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.031
82	-.068	.072	-.029	-.108	-.051	.038	.025	.016	.044	.016	.016	.611		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
83	-.057	.046	-.023	-.078	-.083	.072	.053	.073	.104	.073	.073	.862	.925		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
84	-.054	.043	-.038	-.057	.053	.053	.007	.057	.056	.057	.057	.282	.332	.347		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
85	.021	-.047	-.015	.041	-.114	-.007	.135	.058	.075	.058	.058	.168	.088	.138	.002		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
86	-.042	.008	-.017	-.031	-.058	.065	.090	.067	.090	.067	.067	.633	.660	.724	.685	.462		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.041	-.057	-.051
87	-.008	.004	-.058	.046	-.019	-.016	-.013	-.030	-.031	-.030	-.030	-.061	-.083	-.082	-.034	-.050	-.075		1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
88	.010	-.008	.026	-.009	-.035	.182	.054	.002	-.003	.002	.002	.324	.193	.282	.247	.097	.266	-.056		1.000	1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
89	.047	-.068	.019	.094	.040	.058	.036	.037	.079	.037	.037	.136	.062	.110	.065	.143	.109	-.066	.319		1.000	1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
90	-.075	.042	-.021	-.094	.025	.022	-.025	.041	.043	.041	.041	.100	.073	.094	.143	-.042	.101	.041	.077	-.614		1.000	1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
91	-.027	.046	-.043	-.030	.016	.014	-.018	.025	.026	.025	.025	.213	.177	.211	.049	-.026	.119	.025	-.023	-.376	-.034		1.000	1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
92	-.095	.048	-.094	-.046	.143	.175	.065	.056	.048	.056	.056	.145	.106	.132	.089	.064	.094	-.001	.250	.332	-.007	-.088		1.000	1.000	-.163	-.138	-.182	-.014	-.057	-.051
93	-.048	-.001	-.058	.012	.127	.153	.008	.156	.146	.156	.156	.246	.173	.223	.232	.122	.200	-.033	.476	.496	.045	.027	.565		1.000	-.163	-.138	-.182	-.014	-.057	-.051
94	.079	-.059	.071	.064	-.080	-.100	-.073	.046	.049	.046	.046	.006	-.000	.004	.063	.012	.033	-.023	.048	-.037	.042	.126	-.793	.051		-.163	-.138	-.182	-.014	-.057	-.051
95	.019	-.018	.018	.018	-.078	.080	.063	.087	.128	.087	.087	.609	.437	.574	.141	.056	.353	-.018	.151	.001	.102	.236	.036	.141	-.060		.468	.830	.036	.096	.084
96	-.043	.067	-.017	-.091	-.004	.066	.103	.065	.096	.065	.065	.363	.660	.592	.183	.054	.407	-.039	.082	-.083	.059	.205	.064	.100	-.003	.408		.858	-.019	.146	.142
97	-.019	.014	.002	-.034	-.043	.098	.088	.105	.146	.105	.105	.604	.638	.694	.208	.070	.464	-.031	.144	-.031	.098	.270	.066	.150	.030	.855	.774		-.000	.150	.147
98	-.051	.034	-.053	-.030	.076	-.028	-.026	-.050	-.028	-.050	-.050	-.088	-.064	-.081	-.065	-.089	-.104	-.048	.112	.003	-.027	-.034	-.056	-.058	.026	-.084	-.044	-.079		-.026	.267
99	.089	.032	-.052	.003	-.015	-.039	-.038	-.040	-.055	-.040	-.040	-.112	-.014	-.064	-.024	-.077	-.079	-.044	-.103	-.165	.035	.083	-.061	-.103	-.001	.012	.035	.017	-.023		.771
100	.036	.044	.025	-.033	.026	-.027	-.043	-.026	-.029	-.026	-.026	-.056	.078	.022	.321	-.170	.122	-.070	-.007	-.104	.032	.048	-.060	-.058	.030	-.021	.105	.046	.268	.757	

TOTAL EMR GROUP
r = .107 at .05 level

APPENDIX O-5

CORRELATION MATRIX OF RELATIONSHIPS BETWEEN VARIABLES
70 THROUGH 100 FOR THE FEMALE ERR GROUP AND VARIABLES 70 THROUGH 100 FOR THE FEMALE NORMAL GROUP

FEMALE NORMAL GROUP
r = .138 at .05 level

	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
70		-.644	.922	.711	-.066	-.273	.036	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.082	.085	.110	.105
71	-.658		-.698	-.906	.043	.212	-.019	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.118	-.064	-.118	-.013	-.026	.014	-.065	-.033
72	.880	-.747		.595	-.061	-.242	.021	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.121	.008	.071	.029	.093	.079
73	.767	-.857	.596		-.047	-.238	.013	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.137	.107	.107	.067	.025	.038	.048	.083	.060
74	.167	.253	.189	.217		.084	-.058	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.029	.022	-.011	.110	-.002	.047
75	.167	-.253	.189	.217	-.021		-.011	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.036	-.006	-.033	.022	-.008	-.094
76	-.163	.295	-.079	-.368	-.101		-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	-.058	.010	.062	.052	-.103	-.036	-.052
77	-.179	.117	-.157	-.137	-.030	.296		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
78	-.179	.117	-.157	-.137	-.030	.296	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
79	-.179	.117	-.157	-.137	-.030	.296	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
80	-.179	.117	-.157	-.137	-.030	.296	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
81	.160	-.088	.177	.068	-.199	.317	.104	.080	.080	.080	.080		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
82	.164	-.155	.224	.086	-.169	.149	-.007	-.076	-.076	-.076	-.076	.674		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
83	.922	-.113	.235	.065	-.194	.240	.082	-.001	-.001	-.001	-.001	.923	.888		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
84	.252	-.051	.175	.135	.095	.240	-.104	-.072	-.072	-.072	-.072	-.316	.192	.278		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
85	-.057	.107	-.128	-.027	-.117	.018	-.017	.154	.154	.154	.154	.274	.262	.301	.207		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
86	.208	-.053	.164	.100	-.104	.236	-.071	-.120	-.120	-.120	-.120	.706	.686	.768	.664	.649		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.027	-.078	-.073
87	.167	-.253	.189	.217	-.021	-.101	-.030	-.030	-.030	-.030	-.030	-.034	.036	-.003	.095	-.112	-.004		1.000	1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
88	.122	.025	.076	.028	-.068	.304	.007	-.098	-.098	-.098	-.098	.516	.304	.472	.364	.381	.370	-.068		1.000	1.000	1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
89	.073	.065	.034	.103	.285	.285	-.029	.151	.151	.151	.151	.273	.095	.234	.332	.299	.402	-.073	.544		1.000	1.000	1.000	1.000	1.000	.235	-.194	-.245	-.022	-.078	-.073
90	.179	-.117	.157	.137	.030	.030	-.076	.063	.063	.063	.063	.269	.289	.293	176	-.013	.212	.030	.098	-.407		1.000	1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
91	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		1.000	1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
92	.064	-.134	.007	.186	.327	.327	-.190	.188	.188	.188	.188	.081	.073	.071	.184	.263	.239	-.064	.503	.598	.091	.000		1.000	1.000	-.235	-.194	-.245	-.022	-.078	-.073
93	.180	-.222	.103	.292	.386	.386	-.127	.238	.238	.238	.238	.142	.081	.108	.370	.225	.318	-.054	.466	.738	.077	.000	.846		1.000	-.235	-.194	-.245	-.022	-.075	-.073
94	.179	-.117	.157	.137	.030	.030	.030	.144	.043	.043	.043	.083	-.002	.047	.269	-.118	.082	.030	-.169	.104	-.043	.000	-.464	.077		-.235	-.194	-.245	-.022	-.078	-.073
95	.393	-.185	.367	.211	-.159	.249	.166	-.101	-.101	-.101	-.101	.383	.222	.374	.174	.106	.290	.069	.337	-.030	.207	.000	-.023	.099	.207		.596	.870	.087	.140	.133
96	.187	-.065	.216	.035	-.118	.222	.191	.066	.066	.066	.066	.082	.242	.183	.083	.026	.141	.169	.107	-.070	.231	.000	.031	.178	.238	.429		.898	.068	.238	.217
97	.388	-.218	.389	.213	-.170	.302	.195	-.006	-.006	-.006	-.006	.326	.320	.378	.152	.087	.284	.130	.257	-.062	.270	.000	.009	.177	.276	.896	.722		.898	.068	.238
98	-.033	.034	.010	-.077	-.047	-.055	-.057	-.068	-.068	-.068	-.068	-.224	-.179	-.208	-.256	-.206	-.290	-.047	-.148	-.156	.068	.000	-.078	-.132	-.073	-.087	.032	-.032		.082	.237
99	-.080	-.008	-.047	-.029	-.046	-.054	.120	.116	.116	.116	.116	-.015	.190	.070	-.092	-.093	-.106	-.024	-.169	-.389	.179	.000	-.328	-.261	.180	.118	.207	.197	-.196		.001
100	-.011	-.020	.034	-.028	-.031	.008	.074	.003	.003	.003	.003	-.072	.138	.016	.071	-.175	-.066	-.001	-.167	-.385	.195	.000	-.301	-.248	.152	.052	.269	.182	.123	.839	

FEMALE ERR GROUP
r = .273 at .05 level

APPENDIX O-6

CORRELATION MATRIX OF RELATIONSHIPS BETWEEN VARIABLES
70 THROUGH 100 FOR THE MALE EMR GROUP AND VARIABLES 70 THROUGH 100 FOR THE MALE NORMAL GROUP

MALE NORMAL GROUP
r = .125 at .05 level

	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
70		-.650	.870	-.765	.017	-.059	-.022	-.184	-.104	-.104	-.104	.025	.073	.064	.110	.103	.144	-.060	.060	.114	-.060	.063	-.077	.011	-.078	.035	-.013	.054	.028	.030	.023	.085
71	-.645		-.747	-.850	-.106	.004	.022	.068	.068	-.091	-.091	-.005	.047	.055	.014	.083	.005	-.009	-.018	.060	-.063	-.109	.101	.071	.078	.000	-.011	.078	-.035	.013	-.054	.028	.030	.023	.085
72	.890	-.725		.584	.052	-.009	-.005	-.091	-.091	-.069	-.069	-.069	-.079	-.103	-.108	-.181	-.023	-.043	-.181	-.058	-.088	-.049	-.107	-.047	-.022	.000	-.038	.018	-.045	.022	-.029	-.037	-.040	.031	.014	.018
73	.720	-.897	.587		.063	.033	-.080	-.080	-.080	-.080	-.080	-.029	-.024	-.029	-.004	.085	.021	-.017	-.014	-.042	-.112	-.097	-.038	.000	.038	.083	.042	.031	.013	-.045	-.078	-.035	.067	.028	.008	-.001	.011
74	-.068	.090	-.124	-.033		.176	-.057	-.039	-.080	-.080	-.080	-.080	-.029	-.024	-.029	-.004	.098	.037	.091	-.037	-.042	-.014	-.107	-.022	.000	.038	.083	.042	.031	.013	-.045	-.078	-.035	.067	.028	.008	-.001	.011
75	.060	-.093	.067	-.083	-.008		-.070	-.044	-.044	-.044	-.069	-.069	-.069	-.079	-.103	-.108	-.181	-.023	-.181	-.043	-.058	-.088	-.049	-.107	-.047	-.022	.000	.038	.083	.042	.031	.013	-.045	-.078	-.035	.067	.028	.008	-.001	.011
76	.020	-.063	.060	-.029	.022	-.043		.147	.147	.147	.147	.079	.062	.078	.073	.078	.117	.072	-.119	.044	.027	-.058	.049	-.075	.020	.000	-.020	-.023	.058	.013	-.054	.028	.030	.023	.085								
77	-.230	.148	-.204	-.165	-.017	-.014	-.088																																			
78	-.203	.118	-.177	-.136	-.018	-.015	-.046	.941																																		
79	-.230	.148	-.204	-.165	-.017	-.014	-.088	1.000	.941																																	
80	-.230	.148	-.204	-.165	-.017	-.014	-.088	1.000	.941	1.000																																
81	-.032	-.009	.009	-.097	.008	.028	-.088	.941	1.000	1.000	1.000																															
82	-.066	.070	-.027	-.106	-.038	-.002	.009	.026	.061	.026	.026	.153	.192	.153	.153	.482	.761	.119	.099	.530	.185	.094	-.045	.007	.021	.618	.058	.137	.935	.583	.026	.061	.026	.084	.125	.084	.020	.084	.002	.069	-.065	.038	-.002	.041	-.065	-.047	-.097	.022	.018	-.014	-.025	-.056	.113	-.015	.053	.005	-.033	-.106	-.027	-.017	-.014	-.165	-.204	.148	.230	.230	-.148	.204	.165	.017	.014	.088	-.941	-1.000	-1.000	-1.000	-.941	-.153	-.153	-.192	-.153	-.153	-.482	-.761	-.119	-.099	-.530	-.185	-.094	.045	-.007	-.021	-.618	-.058	-.137	-.935	-.583	-.026	-.061	-.026	-.026	-.084	-.125	-.084	-.020	-.084	-.002	-.069	.065	.038	.002	-.009	.097	-.008	-.028	.088	.014	.027	.204	-.033	.203	-.203	-.033	-.203	-.203	-.033	-.203	-.203	-.033	-.

APPENDIX O-7
CORRELATION MATRIX OF RELATIONSHIP FOR VARIABLES
20 THROUGH 51 WITH VARIABLES
68 THROUGH 100 WITH TOTAL ERR

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
20	-.023	.012	.167	-.071	.136	.098	-.017	.082	-.305	-.077	-.111	-.077	-.077	-.128	-.053	-.099	-.088	.004	-.105	.018	-.058	-.121	.066	.015	-.068	-.050	-.055	-.122	-.070	-.135	-.019	.123	.056
21	-.028	.065	.152	-.033	.103	.078	-.026	.043	-.320	-.115	-.122	-.115	-.115	-.135	-.068	-.106	-.098	.023	-.048	.059	-.105	-.067	-.019	-.048	-.017	-.076	-.035	-.099	-.033	-.085	-.074	-.057	.025
22	-.084	.001	.195	-.090	.164	.135	-.079	.079	-.319	-.056	-.089	-.056	-.056	-.131	-.019	-.075	-.096	.026	-.070	-.006	-.123	-.095	-.026	-.034	-.008	-.081	-.049	-.084	-.035	-.083	.020	.106	.049
23	.005	.062	.086	.032	.067	.005	.042	-.094	-.254	.022	-.102	-.094	-.067	.029	-.016	-.014	-.082	-.014	.046	-.032	-.036	-.054	-.026	.026	.025	-.033	-.054	-.062	-.038	-.054	.035	.033	.061
24	-.061	-.021	-.057	-.025	-.025	-.006	.001	-.037	.220	.101	.108	.101	.089	-.021	.032	.060	.041	.033	-.068	.048	.071	.022	.001	.003	.097	.068	.019	.064	.082	.038	.053	-.015	-.093	-.023
25	.050	-.070	-.080	-.035	-.040	-.003	-.077	-.022	.228	.072	.072	.077	.072	.026	-.011	-.007	-.016	.081	.002	-.014	.046	.005	-.049	-.053	-.050	-.031	.038	.030	.030	.036	-.009	.007	-.018
26	-.009	-.013	.060	-.014	-.010	.082	-.008	-.007	-.062	-.013	-.014	-.013	-.013	.023	-.025	-.029	.018	.011	-.026	-.015	.020	.030	.030	.036	-.022	-.020	-.021
27	.024	.040	.020	-.003	.026	.021	.001	-.218	-.045	-.107	-.112	-.123	-.055	-.134	-.002	-.036	-.002	-.028	-.083	-.027	-.075	-.022	.075	-.028	-.063	.015	-.044	.033
28	.029	.092	.056	-.089	.039	.103	.047	.016	-.161	-.043	-.044	-.047	-.043	-.184	-.237	-.238	-.047	-.090	-.187	-.016	-.080	-.019	.008	-.032	-.088	-.171	-.019	-.166	-.148	-.173	.037	.064	.044
29	.031	.069	.021	-.015	-.004	.039	.036	.010	-.203	-.045	-.045	-.045	-.045	-.138	-.192	-.188	-.056	-.039	-.149	-.004	-.052	-.062	-.003	-.037	-.048	-.119	-.029	-.111	-.094	-.120	.031	.073	.056
30	.057	-.007	.037	-.037	.024	.048	.002	.008	.016	.123	.119	.123	.123	-.006	-.092	-.057	-.034	.059	.005	.005	.005	-.011	-.032	-.026	-.026	-.032	-.042	-.026	-.093	-.070	.036	-.051	-.071
31	.078	.035	.028	-.032	.021	.038	-.008	-.066	.009	.018	.023	.018	.018	-.053	-.162	-.118	-.046	.013	-.053	-.015	-.066	-.008	-.025	-.045	-.088	-.080	.048	-.083	-.150	-.130	.040	.007	-.027
32	.052	.073	.044	.047	-.039	-.030	-.029	-.112	-.020	-.072	-.072	-.072	-.061	-.069	-.095	-.099	-.077	-.029	-.073	.017	-.074	-.021	-.032	-.042	-.097	-.105	.040	-.052	-.097	-.078	.057	.039	.024
33	-.069	-.067	-.007	.005	-.011	-.001	.131	.033	-.039	.055	.035	.055	.055	-.022	.009	-.005	.027	-.030	.036	-.025	.036	-.096	.068	.082	-.110	-.011	.125	-.066	.008	-.064	.063	.047	.077
34	-.086	-.032	.042	-.061	.069	.033	-.068	-.050	-.018	-.030	-.030	-.030	-.031	-.144	-.100	-.133	-.024	-.046	-.078	-.009	-.077	-.141	.077	.041	-.177	-.128	.120	-.117	-.098	-.148	.076	.049	.039
35	-.020	.005	.049	-.040	.072	.016	.064	-.059	.004	-.057	-.037	-.057	-.057	-.130	-.106	-.140	-.033	-.064	-.107	.018	-.078	-.105	.056	.006	-.109	-.117	.046	-.073	-.080	-.097	.064	.015	.025
36	.025	-.052	-.089	.086	-.126	-.045	.107	.100	-.059	-.049	-.071	-.049	-.049	-.024	-.107	-.083	-.072	-.077	-.088	.062	-.060	-.019	-.060	-.031	-.014	-.018	.003	-.020	-.147	-.078	.047	.035	-.060
37	.028	-.050	-.099	.095	-.131	-.060	.103	.087	-.047	-.053	-.053	-.053	-.053	-.022	-.106	-.082	-.062	-.082	-.085	.063	-.060	-.027	-.018	.004	-.017	-.018	.008	-.017	-.149	-.075	.039	.025	-.063
38	.029	.017	-.082	.014	-.066	-.027	.018	-.035	.054	-.018	-.011	-.018	-.018	.011	-.050	-.028	-.043	-.040	-.056	.012	-.002	-.131	.180	.012	-.023	-.009	.022	-.057	-.010	-.024	.000	-.093	-.174
39	-.028	-.122	-.009	.005	-.005	-.009	.079	.134	.014	-.060	-.061	-.060	-.060	-.013	-.089	-.061	-.117	-.070	-.101	.000	.028	-.019	.033	-.001	-.050	.004	.063	-.011	-.134	-.068	.015	-.076	-.156
40	-.007	-.126	-.052	.030	-.037	.044	-.070	.091	.039	-.058	-.055	-.058	-.058	-.031	-.089	-.077	-.087	-.087	-.053	.000	.065	-.024	-.135	-.070	-.016	-.052	-.128
41	.049	-.042	-.097	.071	-.068	-.096	.026	-.105	.082	-.004	-.006	-.004	-.004	-.036	-.008	-.038	.068	-.036	.046	-.042	-.116	-.073	.022	.033	-.049	-.032	.035	-.019	-.009	.001	-.072	.005	.044
42	.019	.019	.021	-.016	.018	.018	-.046	-.034	-.069	-.018	-.023	-.082	-.014	.016	-.144	-.127	.081	-.063	-.125	-.093	.032	.073	.092	.048	.023	.043	.081	-.063	-.125	-.093	.032	.073	.092
43	.022	.003	.047	-.030	.044	.031	-.058	.056	-.037	-.153	-.153	-.153	-.153	-.081	-.128	-.121	-.026	-.034	-.066	-.054	.016	-.012	-.066	-.002	-.139	-.090	.102	-.098	-.136	-.119	.042	.071	.071
44	.003	.059	.100	-.072	.116	.053	-.086	.021	-.011	-.069	-.068	-.069	-.069	-.099	-.106	-.116	-.084	-.072	-.107	.023	-.056	-.095	-.114	.064	-.018	-.097	-.109	.038	-.109	-.144	-.139	-.034	-.067	-.099
45	-.017	-.031	.019	-.001	.014	.004	.036	-.000	.017	-.178	-.171	-.178	-.178	-.032	.010	-.013	.046	.019	.010	-.055	.082	.071	.027	-.048	.045	.117	.032	-.091	.015	-.052	-.002	-.063	-.104
46	-.004	.048	-.023	.006	-.002	-.026	-.069	.004	.052	-.040	-.049	-.040	-.040	-.112	-.119	-.131	-.068	-.074	-.107	.043	-.095	-.114	.064	-.018	-.097	-.109	.038	-.109	-.144	-.139	-.034	-.067	-.099
47	-.011	-.002	-.140	.169	-.138	-.145	.027	-.088	.073	.005	-.009	.005	.005	-.054	-.006	-.031	.015	-.018	-.017	.032	-.047	-.008	.070	-.055	-.002	.016	.014	-.089	-.033	-.067	-.087	-.092	-.087
48	-.013	-.043	-.071	.065	-.072	-.061	-.023	.062	-.059	-.080	-.071	-.080	-.080	-.030	-.039	-.042	-.025	.020	-.025	-.068	-.092	.013	-.036	-.085	-.068	-.050	-.065	-.032	-.089	-.063	-.052	-.032	-.027	-.109
49	-.000	-.058	-.021	.022	-.038	-.004	-.117	.114	-.044	-.050	-.065	-.050	-.050	-.050	-.132	-.108	-.085	-.029	-.024	-.058	-.036	-.058	-.024	-.029	-.111	-.076	.078	-.052	-.161	-.109	.050	.032	-.023
50	.008	-.058	-.036	.028	-.040	-.023	-.106	.071	-.021	-.100	-.106	-.100	-.100	-.085	-.155	-.143	-.075	-.087	-.113	.005	-.057	-.063	-.003	.006	-.116	-.075	.085	-.083	-.191	-.141	.061	.025	-.043
51	.033	-.017	-.061	.040	-.037	-.062	.039	-.081	.047	-.138	-.124	-.138	-.138	-.094	-.076	-.103	-.008	-.046	-.071	-.015	-.051	-.045	.085	-.055	-.025	-.010	.060	-.089	-.093	-.091	-.020	-.003	-.072

APPENDIX O-8
CORRELATION MATRIX OF RELATIONSHIP FOR VARIABLES
20 THROUGH 51 WITH VARIABLES
68 THROUGH 100 WITH TOTAL NORMAL

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
20	-.080	.044	-.025	.031	-.027	.028	.025	.014	-.171	-.097	.097	-.097	-.097	.122	-.122	-.122	-.122	-.122	-.122	-.122	-.122	-.122	-.122	-.122	-.122	-.122	-.122	-.020	.067	.037	-.005	.018	-.003
21	-.068	.019	-.059	.067	-.052	.072	.040	.010	-.127	-.090	.090	-.090	-.090	.129	-.129	-.129	-.129	-.129	-.129	-.129	-.129	-.129	-.129	-.129	-.129	-.129	-.129	.014	.087	.065	.013	.060	.012
22	-.015	.051	-.051	.096	-.039	.105	-.003	.022	-.083	-.131	.131	-.131	-.131	.131	-.226	-.226	-.226	-.226	-.226	-.226	-.226	-.226	-.226	-.226	-.226	-.226	-.226	.013	.069	.046	.006	.037	.017
23	-.005	.024	.023	.003	-.020	.043	-.014	.078	-.153	-.062	.062	-.062	-.062	.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	.096	.037	-.022	.027	.064	.079
24	-.022	.006	-.009	.019	.007	-.035	-.013	-.070	.100	-.012	.012	-.012	-.012	.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012	.128	.008	.072	-.008	-.059	-.059
25	.031	-.036	.062	-.009	.014	-.052	.037	-.067	.160	.117	-.117	.117	.117	-.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.030	-.066	-.036	-.040	-.055	-.077
26	-.007	-.007	.090	-.013	.101	.003	-.004	-.005	-.066	-.008	.008	-.008	-.008	.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	-.004	.038	-.035	-.042	.022	.052	-.011
27	-.029	.014	-.047	.051	-.052	.044	.008	.027	-.150	-.042	.042	-.042	-.042	.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	.104	-.127	.143	-.017	.059	-.025
28	.010	.028	-.006	-.006	.007	-.008	.009	.030	-.167	-.033	.033	-.033	-.033	.033	-.011	-.011	-.011	-.011	-.011	-.011	-.011	-.011	-.011	-.011	-.011	-.011	-.011	.039	-.026	.040	-.042	.001	.009
29	-.010	.023	-.025	.025	-.020	.030	.009	.035	-.175	-.041	.041	-.041	-.041	.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	-.025	.074	-.084	.098	-.032	.028	-.005
30	.021	.028	-.026	-.015	.002	-.016	.125	.037	.070	-.065	.065	-.065	-.065	.020	-.020	-.020	-.020	-.020	-.020	-.020	-.020	-.020	-.020	-.020	-.020	-.020	-.020	.096	-.003	.060	-.066	.006	.055
31	.037	.037	-.028	-.012	.018	.001	.090	.039	.089	-.056	.056	-.056	-.056	.056	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	.104	-.026	.077	-.063	.051	.088
32	.047	.038	-.007	-.023	.031	.047	.012	.023	.084	-.001	.001	-.001	-.001	.001	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	.093	-.070	.093	-.031	.107	.096
33	.029	.051	-.044	.021	-.007	.059	-.012	.072	.045	-.105	.105	-.105	-.105	.130	-.130	-.130	-.130	-.130	-.130	-.130	-.130	-.130	-.130	-.130	-.130	-.130	-.130	.067	-.072	.078	-.057	.051	.046
34	.037	.065	-.077	.057	-.057	.076	-.027	.079	.061	-.063	.063	-.063	-.063	.101	-.101	-.101	-.101	-.101	-.101	-.101	-.101	-.101	-.101	-.101	-.101	-.101	-.101	.129	-.080	.113	-.071	.136	.116
35	.041	.047	-.036	.041	-.044	.031	.030	.056	.060	.016	.016	.016	.016	.041	-.041	-.041	-.041	-.041	-.041	-.041	-.041	-.041	-.041	-.041	-.041	-.041	-.041	.115	-.075	.100	-.045	.166	.148
36	.064	.009	-.087	.043	-.054	.077	.059	.091	-.101	-.093	.093	-.093	-.093	.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	-.033	.056	-.065	.065	-.013	.102	-.081
37	.069	.014	-.083	.035	-.048	.070	.064	.106	.034	-.088	.088	-.088	-.088	.029	-.029	-.029	-.029	-.029	-.029	-.029	-.029	-.029	-.029	-.029	-.029	-.029	-.029	.053	-.067	.064	-.020	.104	-.075
38	.040	.040	-.014	.035	.018	.001	.023	.047	.110	.047	.047	.047	.047	.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	.005	-.013	.004	-.027	.040	.019
39	.045	.023	-.110	.018	.094	.036	.050	.045	.075	-.052	.052	-.052	-.052	.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	.011	-.057	.023	-.037	.074	.057
40	.043	.022	-.123	.022	.088	.059	.055	.068	.101	-.038	.038	-.038	-.038	.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	-.005	.038	-.050	.003	-.028	.061	-.040
41	-.003	.002	-.030	.005	.023	-.061	.020	-.114	.123	.053	-.053	.053	.053	-.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.108	-.011	.054	-.030	.011	.049
42	-.005	.012	-.031	-.009	-.011	.013	.091	.051	.039	-.140	.140	-.140	-.140	.061	-.061	-.061	-.061	-.061	-.061	-.061	-.061	-.061	-.061	-.061	-.061	-.061	-.061	.095	-.062	.099	-.034	.001	-.041
43	.033	.039	-.018	-.059	.021	.014	.094	.036	.107	-.135	.135	-.135	-.135	.057	-.057	-.057	-.057	-.057	-.057	-.057	-.057	-.057	-.057	-.057	-.057	-.057	-.057	.055	-.055	.071	-.076	.016	-.022
44	.066	.036	.023	-.059	.043	.035	-.015	-.041	.115	.056	-.056	.056	.056	-.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.071	.002	.047	.064	-.039	.022
45	-.002	-.035	-.025	-.010	-.092	.016	.141	-.021	.117	.012	-.012	.012	.012	-.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.077	.006	.044	.015	-.030	-.047
46	.018	-.004	-.093	.050	-.086	-.057	.142	-.054	.086	.030	-.030	.030	.030	-.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.023	.001	.012	.057	-.068	-.051
47	.031	.039	-.085	.063	-.071	.023	-.054	-.032	.025	.025	.025	.025	.025	-.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.075	.017	.059	.067	-.025	.020
48	.090	.070	-.031	-.003	-.018	.012	.005	.001	.124	.045	.045	.045	.045	.045	.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	-.031	.033	-.036	-.005	.059	-.000	.059
49	.046	.008	-.103	.021	.070	-.056	.094	-.047	.074	-.132	.132	-.132	-.132	.063	-.063	-.063	-.063	-.063	-.063	-.063	-.063	-.063	-.063	-.063	-.063	-.063	-.063	.079	-.080	-.092	.051	-.058	-.059
50	.067	.025	-.117	.021	-.073	-.068	.091	-.068	.109	-.106	.106	-.106	-.106	.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	.048	-.065	-.062	.065	-.039	-.021
51	.060	.050	-.030	-.004	-.003	-.026	.004	-.064	.107	.073	-.073	.073	.073	-.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.067	.023	.062	.031	.050	.098

APPENDIX O-9
CORRELATION MATRIX OF RELATIONSHIP FOR VARIABLES
20 THROUGH 51 WITH VARIABLES
68 THROUGH 100 WITH NORMAL FEMALE

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
20	-.136	.045	-.014	-.016	-.009	.009	.045	.014	-.183	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.166	-.012	-.045	-.031	-.011	.102	.033
21	-.064	.061	-.034	.032	.006	-.074	.061	-.039	-.118	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.204	-.029	.013	.025	.055	.137	.067
22	-.108	.068	.025	.037	.040	-.051	-.004	-.006	-.065	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.328	-.005	.048	.041	.012	.118	.098
23	-.052	.012	.026	-.084	.030	.077	-.012	.031	-.149	-.037	-.037	-.037	-.037	-.037	-.037	-.037	-.037	-.307	-.307	-.307	-.307	-.307	-.307	-.307	-.307	-.307	-.307	-.037	-.046	.008	-.023	-.007	.014	-.019
24	-.008	.016	-.023	.111	-.064	-.074	-.027	-.078	.132	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.114	.067	.111	.032	-.014	.043
25	.094	-.037	-.025	.049	-.000	-.074	.046	.016	.128	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	-.040	-.059	-.061	-.024	-.007	-.007
26	-.012	-.009	.132	-.019	.144	.008	-.009	.020	-.101	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.009	-.070	-.045	-.065	-.034	.086	-.011
27	-.045	.082	-.208	.164	-.214	-.153	.011	.057	-.199	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.046	-.154	-.176	-.189	-.067	-.097	-.016
28	.008	.111	-.121	.070	-.098	-.092	.014	.091	-.221	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.019	-.157	-.137	-.160	.066	-.037	-.028
29	-.022	.102	-.173	.132	-.165	-.137	.013	.068	-.229	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.036	-.160	-.172	-.187	.070	-.065	-.016
30	.018	.048	-.033	.031	-.022	-.041	.190	.043	-.004	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.023	-.006	-.023	.010	.002	.058	-.036
31	.036	.032	-.007	.039	-.017	-.027	.148	.065	.051	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.032	.040	.011	-.006	.022	.021	.032
32	.056	.009	.033	.029	-.009	.017	.022	.064	.162	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.040	-.066	-.016	-.033	-.017	.117	.081
33	-.036	.036	-.155	.192	-.101	-.244	-.017	.052	.050	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.211	-.005	-.121	-.073	.049	-.066	-.029
34	-.021	.030	-.112	.146	-.079	-.177	.035	.030	.043	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.158	-.009	-.116	-.067	.074	.029	.061
35	.045	.009	-.002	-.002	-.000	.001	-.035	.032	.036	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.051	-.047	-.010	.057	.117	.122
36	.031	-.030	-.104	.131	-.109	-.122	.074	-.027	.008	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.086	-.153	-.182	.070	-.151	-.075
37	.038	-.028	-.092	.119	-.100	-.107	.081	-.026	.016	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.080	-.156	-.179	.081	-.151	-.068
38	.062	.030	.001	.006	-.020	.017	.030	.054	.039	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	-.005	-.008	-.011	-.015	.021	
39	.026	-.004	-.136	-.006	-.072	-.064	.051	.046	.079	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.042	-.052	-.015	.022	-.086	-.047	
40	.030	-.000	-.131	.003	-.073	-.067	.056	.054	.089	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.039	-.036	.004	.018	-.062	-.020	
41	.039	.027	.052	.047	.001	.010	.027	.020	.105	.027	+.027	+.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.081	.108	.130	-.008	.105	.153	
42	.011	.048	-.096	-.013	-.022	-.068	.140	.138	-.093	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.096	-.168	-.060	-.140	.003	.029	-.012	
43	.052	.055	-.057	-.082	.013	.003	.138	.124	-.035	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.099	-.119	-.066	-.119	.063	-.006	.006	
44	.067	-.009	.089	-.084	.050	.122	-.042	-.046	.130	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.110	.002	.068	.057	-.092	.004	
45	-.032	-.034	-.041	-.006	.007	-.046	.211	.056	.022	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.034	-.088	-.035	-.073	-.017	-.016	-.029	
46	-.021	-.015	-.098	.030	-.053	-.078	.210	.047	.025	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.056	-.079	-.049	-.074	.021	-.072	-.041	
47	.020	.029	-.128	.073	-.145	-.054	.029	.014	-.022	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	-.053	.050	.023	.044	.064	-.083	-.002	
48	.077	-.055	-.030	-.004	-.061	.037	-.001	.066	.049	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	-.055	.032	.021	.036	.037	-.029	.050	
49	.022	.015	-.155	.069	-.089	-.139	.134	.064	.010	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.127	-.138	-.126	-.154	.051	-.065	-.052	
50	.045	.017	-.123	.057	-.077	-.106	.124	.037	.046	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.111	-.075	-.097	-.098	.077	-.055	.005	
51	.062	.010	.098	-.045	.051	.095	-.004	-.043	.076	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	-.125	.036	.103	.054	.062	.131	

APPENDIX O-10
CORRELATION MATRIX OF RELATIONSHIP FOR VARIABLES
20 THROUGH 51 WITH VARIABLES
68 THROUGH 100 WITH EMR FEMALE

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
20	-.077	-.123	.261	-.362	.282	.324	-.123	.199	-.150	-.176	-.176	-.176	-.176	-.155	.078	-.081	-.063	.100	-.019	.107	.083	-.174	.011	.000	.028	-.041	-.120	.052	.080	.105	-.017	.243	.274
21	-.101	-.090	.459	-.325	.352	.428	.135	.135	-.342	-.182	-.182	-.182	-.182	-.108	-.059	-.089	-.048	.148	.016	.098	-.061	-.077	.021	.000	.171	.059	-.220	.133	.082	.135	.052	.051	.143
22	-.235	-.247	.216	-.256	.148	.315	-.082	.138	-.313	-.117	-.117	-.117	-.117	-.081	-.072	-.100	-.112	.113	-.057	.138	-.069	-.249	.039	.000	.044	-.070	-.198	.190	.026	.155	-.039	.199	.190
23	.141	.055	.231	-.203	.125	.307	.012	.186	-.220	-.139	-.139	-.139	-.139	-.185	-.067	-.149	.011	.086	-.028	-.032	-.073	.025	-.110	.000	.102	.049	-.110	-.098	-.099	-.106	-.225	.125	.045
24	-.207	-.145	-.028	.001	.055	-.087	.157	-.220	.098	.117	.117	.117	.117	.221	.039	.160	.079	-.121	.063	.006	.130	.101	.153	.000	-.010	.113	.207	.163	.004	.114	.185	.201	-.157
25	-.035	.051	-.366	.323	-.242	.441	-.177	-.101	.293	.127	.127	.127	.127	.122	.094	120	-.096	-.029	-.003	.051	.002	-.140	.035	.000	-.020	-.195	.035	.028	.207	.102	.196	-.007	.086
26	-.030	-.021	.167	.082	-.110	.217	.021	-.021	-.101	-.030	-.030	-.030	-.030	-.007	-.083	-.049	-.050	-.073	-.073	-.021	-.068	-.073	.030	.000	-.064	-.054	.030	-.056	-.006	-.032	-.047	.132	.122
27	.057	.064	.160	-.068	.111	.120	.016	-.063	-.255	-.034	-.034	-.034	-.034	-.072	-.230	-.158	-.134	-.069	-.185	.025	.056	-.017	-.183	.000	-.038	-.069	-.043	.018	.022	.049	.058	-.183	-.176
28	.082	.089	.108	.070	-.003	.054	.006	-.158	-.261	-.109	-.109	-.109	-.109	-.252	-.349	-.306	-.182	-.094	-.306	.089	-.137	-.180	-.127	.000	-.225	-.232	.035	.016	-.071	.004	.243	.014	.019
29	.069	.076	.151	-.025	.078	.104	.013	-.098	-.270	-.061	-.061	-.061	-.061	-.137	-.282	-.216	-.157	-.081	-.235	.048	-.086	-.073	-.173	.000	-.103	-.128	-.019	.018	-.009	.036	.124	-.126	-.119
30	.232	.162	-.008	.122	-.034	-.087	-.117	.082	.361	.003	.003	.003	.003	.038	-.076	.017	.044	-.019	.028	.082	.197	.233	-.260	.000	-.023	.024	.082	.069	.030	.090	-.123	-.165	-.172
31	.440	.308	-.034	.243	-.131	-.126	-.149	-.149	.286	-.148	-.148	-.148	-.148	-.095	-.060	-.096	-.053	.098	-.076	.125	.060	-.171	.050	.000	-.107	-.110	.017	.098	.067	.147	-.046	.043	.012
32	.234	.164	-.032	.264	-.129	-.145	-.155	-.263	.118	-.225	-.225	-.255	-.255	-.212	-.169	-.236	-.166	-.116	-.226	.061	-.128	-.344	.047	.000	-.193	-.240	-.037	.093	-.064	.054	.113	.100	.111
33	.231	.051	-.038	.098	-.009	-.124	.016	.222	.028	.072	.072	.072	.072	-.051	.012	-.026	.356	.136	.184	-.069	.035	.022	.148	.000	.057	.079	.025	-.232	.186	-.097	-.051	.073	.142
34	.087	.279	-.089	.211	-.107	-.181	.039	-.004	.143	-.037	-.037	-.037	-.037	-.050	-.058	-.082	.170	.044	.026	-.070	-.118	-.245	.224	.000	-.172	-.162	.053	-.077	-.099	-.090	.030	.081	.043
35	.005	.206	.054	.001	.027	.029	.009	-.095	.092	-.095	-.095	-.095	-.095	.006	-.056	-.053	-.036	-.075	-.085	-.055	-.097	-.270	.211	.000	-.174	-.152	.074	.124	-.202	.040	.138	.055	-.020
36	.201	-.003	-.080	.043	-.231	.116	-.160	.284	-.160	-.158	-.158	-.158	-.158	-.195	-.275	-.261	.197	-.054	-.043	.075	.038	.020	-.048	.000	.161	.107	-.123	-.080	-.087	-.072	-.066	-.091	-.043
37	.200	.003	-.060	.037	-.218	.129	-.159	.266	-.163	-.183	-.183	-.183	-.183	-.192	-.270	-.259	.202	-.074	-.044	.072	.032	-.008	-.020	.000	.143	.093	-.114	-.065	-.085	-.061	-.052	-.097	-.043
38	.065	.100	.195	-.072	.129	.143	-.009	-.063	-.059	-.363	-.363	-.363	-.363	.040	.101	.047	.149	-.184	.083	-.009	.011	-.260	.285	.000	-.090	-.070	.052	.148	.025	.129	.120	-.088	.003
39	-.111	-.297	.046	.031	-.021	.042	.049	.226	-.165	-.165	-.165	-.165	-.165	-.166	-.229	-.190	-.117	-.073	-.138	-.027	.131	.131	-.076	.000	.170	.087	-.173	-.121	-.135	-.117	.056	-.193	-.151
40	-.050	-.259	-.034	.016	-.100	.054	.042	.205	-.207	-.184	-.184	-.184	-.184	-.266	-.285	-.323	-.143	-.092	-.224	-.064	.025	.019	-.078	.000	.160	.098	-.136	-.200	-.197	-.193	.021	-.176	-.183
41	.102	.027	-.221	.077	-.225	-.075	-.002	.012	-.078	-.109	-.109	-.109	-.109	-.219	-.150	-.283	-.131	-.046	-.199	-.091	-.143	-.164	-.039	.000	.015	.038	.035	-.153	-.165	-.164	-.057	-.120	-.272
42	.006	.010	-.176	.051	-.198	-.030	-.108	-.001	-.199	-.162	-.162	-.162	-.162	-.189	-.066	-.134	-.134	-.037	-.108	-.102	-.229	-.136	-.230	.000	-.248	-.238	.070	-.137	.072	-.029	-.010	.378	.337
43	.095	.112	-.224	.109	-.276	-.054	-.070	.112	-.201	-.247	-.247	-.247	-.247	-.225	-.080	-.175	-.040	-.039	-.066	-.086	-.184	-.114	-.219	.000	-.169	-.159	.052	-.099	.056	-.029	-.126	.330	.247
44	.129	.166	-.019	.080	-.069	-.023	.139	.180	.044	-.165	-.165	-.165	-.165	-.002	.011	-.028	.266	-.012	.144	.070	.150	.125	.067	.000	.241	.252	-.031	.073	-.011	-.012	-.204	-.299	-.271
45	.062	.063	-.112	.085	-.091	-.105	-.131	-.248	-.131	-.077	-.077	-.077	-.077	-.340	-.161	-.275	-.222	-.188	-.293	-.054	-.375	-.366	-.062	.000	-.328	-.374	-.006	-.222	-.141	-.166	.100	.240	.255
46	.145	.118	-.176	.099	-.077	-.200	-.050	-.320	.042	-.120	-.120	-.120	-.120	-.334	-.192	-.291	-.069	-.188	-.209	.017	-.264	-.259	-.025	.000	-.283	-.247	.120	-.175	-.076	-.165	.103	.026	.065
47	.135	.094	-.116	.107	-.055	-.167	.094	-.469	.211	-.134	-.134	-.134	-.134	-.157	-.084	-.138	.100	-.068	.005	.094	-.077	-.103	.085	.000	-.169	-.078	.187	-.089	-.016	-.122	.008	-.138	-.114
48	.148	.159	.032	.068	-.075	.049	.048	-.064	.029	-.251	-.251	-.251	-.251	-.118	-.146	-.162	.040	-.083	-.038	-.064	-.047	.050	-.068	.000	.018	.076	.091	.057	-.152	-.063	-.043	-.233	-.293
49	.117	-.062	-.111	.077	-.207	.026	-.121	.220	-.190	-.186	-.186	-.186	-.186	-.249	-.235	-.255	.041	-.050	-.095	-.025	-.050	-.016	-.145	.000	.003	-.038	-.069	-.175	-.025	-.096	-.027	.085	.113
50	.169	.015	-.146	.110	-.267	.020	-.100	.210	-.183	-.263	-.263	-.263	-.263	-.304	-.290	-.342	.056	-.095	-.139	-.012	-.068	-.098	-.080	.000	.022	-.018	-.070	-.152	-.107	-.123	-.052	.015	.009
51	.134	.191	-.111	.097	-.173	-.028	.035	.004	.018	-.242	-.242	-.242	-.242	-.136	-.133	-.212	.037	-.144	-.110	.016	-.062	-.211	.130	.000	.011	.024	.019	.050	-.170	-.049	-.071	-.133	-.219

APPENDIX O-11
CORRELATION MATRIX OF RELATIONSHIP FOR VARIABLES
20 THROUGH 51 WITH VARIABLES
68 THROUGH 100 FOR EMR MALE

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
20	.016	.028	.122	-.002	.082	.038	.016	.063	-.324	-.052	-.096	-.052	-.052	-.071	-.033	-.052	-.071	-.016	-.086	.002	-.068	-.093	.079	-.064	.030	-.009	-.039	-.120	-.081	-.150	-.026	.086	.011
21	.014	.062	.073	.033	.035	.001	-.061	.026	-.306	-.097	-.107	-.097	-.097	-.103	-.037	-.070	-.089	-.003	-.030	.051	-.098	-.050	-.022	-.043	-.046	-.100	-.004	-.120	-.040	-.103	-.094	.041	-.005
22	-.018	.035	.170	-.044	.121	.087	-.075	.072	-.310	-.038	-.061	-.038	-.038	-.105	.021	-.030	-.077	.008	-.044	-.031	-.120	-.046	-.033	-.029	-.007	-.056	-.023	-.119	-.031	-.109	.023	.077	.016
23	-.034	.062	.047	.081	.020	-.056	.054	-.024	-.255	-.082	-.092	-.082	-.082	-.016	.062	.034	-.009	-.118	.005	.056	-.016	-.037	-.044	.034	.015	-.049	-.044	-.034	-.015	-.023	.063	.010	.056
24	-.020	-.003	-.055	-.036	-.030	.013	-.039	.014	.241	.097	.105	.097	.097	.046	-.041	-.006	.052	.073	.017	-.078	.023	.060	.001	-.002	.002	.090	.048	.052	.017	.031	-.035	-.011	-.002
25	.075	-.087	-.017	-.100	.006	.077	-.056	.023	.210	.058	.066	.058	.058	-.017	-.043	-.037	-.012	.104	-.011	-.021	.049	.030	.049	-.062	-.025	.014	.036	.022	.026	.026	-.030	.017	-.024
26	-.006	-.010	.042	-.066	.048	.059	-.006	-.005	-.031	-.010	-.010	-.010	-.010	.007	.050	.037	.002	.071	.051	-.010	-.017	-.021	.014	.009	-.019	-.008	.016	.051	.037	.049	-.016	-.061	-.056
27	.022	.033	-.053	.037	-.067	-.022	.031	.046	-.200	-.046	-.048	-.046	-.046	-.080	-.055	-.074	-.019	-.092	-.091	-.012	-.009	-.029	.051	-.027	-.006	-.040	-.012	-.077	-.030	-.074	.003	.088	069
28	.030	.092	.013	-.094	.016	.090	.067	.093	-.121	-.020	-.024	-.020	-.020	-.116	-.187	-.179	-.001	-.092	-.125	-.039	-.038	-.072	.037	-.025	-.035	-.108	-.020	-.151	-.149	-.186	.006	.052	.031
29	.031	.069	.049	.013	-.060	-.002	.054	.075	-.171	-.035	-.037	-.035	-.035	-.092	-.146	-.141	-.013	-.027	-.092	-.021	-.014	-.041	.044	-.035	-.012	-.071	-.025	-.121	-.106	-.142	.012	.05	.080
30	.034	-.031	.012	-.030	.000	.042	.034	.001	-.022	.154	.145	.154	.154	.043	-.057	-.019	-.022	.073	.041	-.059	-.059	-.010	.000	-.024	-.010	-.044	-.013	.004	-.096	-.059	.046	-.060	-.081
31	.026	.002	-.007	-.027	-.003	.024	.026	-.039	-.007	.053	.055	.053	.053	.027	-.104	-.058	-.017	.020	-.000	-.036	-.062	.043	-.029	-.034	-.067	-.021	.063	-.056	-.163	-.127	.040	-.025	-.056
32	.008	.057	-.077	.038	-.053	-.059	.009	-.059	-.032	-.034	-.023	-.034	-.034	.016	-.050	-.026	-.044	-.012	-.008	.007	-.039	.071	-.141	-.037	-.061	-.016	.059	-.047	-.088	-.073	.047	.011	-.004
33	-.161	-.081	-.002	-.007	-.011	.016	-.165	-.013	-.050	.053	.029	.053	.053	-.018	.008	-.003	-.015	-.058	.011	-.020	-.052	-.119	.058	.087	-.143	-.044	.136	-.036	-.024	-.061	.074	.045	.071
34	-.111	-.066	.020	-.057	.052	.025	-.081	-.050	-.017	-.024	-.026	-.024	-.024	-.105	-.060	-.085	-.016	-.060	-.048	-.009	-.096	-.112	.070	.056	-.167	-.089	.139	-.073	-.077	-.114	.075	.022	.018
35	.001	-.027	.004	-.009	.036	-.022	.089	-.038	.014	-.044	-.022	-.044	-.044	-.116	-.061	-.090	-.002	-.066	-.062	-.019	-.041	-.050	.043	.022	-.076	-.055	.056	-.050	-.029	-.067	.051	.002	.006
36	-.057	-.058	-.066	.073	-.084	-.054	-.100	.034	-.053	-.029	-.056	-.029	-.029	-.027	-.116	-.029	-.136	-.082	-.133	.064	-.109	-.045	-.032	-.007	-.071	-.117	-.015	-.047	-.181	-.121	.066	.073	-.049
37	-.053	-.056	-.082	.084	-.091	-.072	-.096	.021	-.039	-.028	-.053	-.028	-.028	-.028	-.118	-.093	-.127	-.083	-.131	.066	-.109	-.049	-.022	-.004	-.072	-.112	.019	-.049	-.185	-.122	.056	.063	-.052
38	.024	.014	-.095	.011	-.072	-.031	.020	-.040	.059	.004	.011	.004	.004	-.006	-.071	-.051	-.060	-.032	-.080	.014	-.010	-.136	.177	.010	-.025	-.016	.019	-.038	-.072	-.052	-.002	-.090	-.180
39	-.021	-.096	.010	-.022	.026	.006	-.118	.130	.032	-.044	-.045	-.044	-.044	-.028	-.108	-.086	-.139	-.069	-.131	.008	-.018	-.069	.046	-.011	-.114	-.072	.088	-.030	-.156	-.101	.016	-.043	-.145
40	-.009	-.105	-.030	.011	.001	-.040	-.106	.049	.076	-.035	-.032	-.035	-.035	-.020	-.094	-.074	-.098	-.086	-.095	-.005	-.073	-.076	.054	-.001	-.118	-.082	.088	-.021	-.142	-.081	-.016	-.016	-.109
41	.034	-.054	-.078	.075	-.044	-.105	.034	-.145	.120	.021	.032	.021	.021	.021	.022	.024	-.106	-.035	.107	-.035	-.106	-.048	.033	.038	-.062	-.059	.037	.026	.030	.052	-.077	.069	.086
42	.023	.021	.060	-.029	.059	.028	-.032	-.066	-.012	-.043	-.048	-.043	-.043	-.047	-.142	-.117	-.036	-.033	-.066	-.006	.024	-.012	-.061	.014	-.124	-.104	.082	-.052	-.169	-.117	.037	.033	.064
43	.002	-.010	.090	-.049	.093	.043	-.057	.044	-.009	-.137	-.137	-.137	-.137	-.057	-.139	-.118	-.025	-.033	-.069	-.050	.059	.006	-.046	-.003	-.136	-.080	.108	-.104	-.173	-.143	.058	.040	.053
44	-.018	-.060	.022	-.011	.027	.005	.013	-.053	.013	-.181	-.172	-.181	-.181	-.935	.015	-.004	.016	.025	-.012	-.074	.070	.062	.022	-.051	.003	.082	.042	-.131	.022	-.058	.019	-.020	-.086
45	-.014	.059	.135	-.093	.143	.076	-.076	.098	.013	-.067	-.066	-.067	-.067	-.046	-.099	-.087	-.063	-.050	-.065	.033	.018	-.145	.080	.033	-.093	-.121	.038	-.037	-.124	-.099	.024	-.007	-.052
46	-.057	.037	.005	-.008	.011	.002	-.074	.106	.055	-.022	-.034	-.022	-.022	-.061	-.110	-.101	-.068	-.050	-.087	.047	-.052	-.081	-.078	-.019	-.054	-.062	.027	-.096	-.160	-.136	-.050	-.082	-.123
48	-.061	-.017	-.149	.160	-.159	-.145	.011	.028	.047	.036	.018	.036	.036	-.026	.009	-.005	.005	-.008	-.018	.023	-.038	.016	.069	-.059	.038	.062	-.009	-.088	-.035	-.052	-.099	-.088	-.087
48	-.063	-.068	-.087	.064	-.071	-.076	-.039	-.061	.068	-.049	-.040	-.049	-.049	-.016	-.028	-.025	-.034	.038	-.025	-.068	-.008	-.018	.082	.012	-.021	.065	.060	-.056	-.079	-.071	-.053	.000	-.088
49	-.049	-.056	.012	.000	.006	.005	-.121	.082	-.027	-.027	-.044	-.027	-.027	-.039	-.144	-.115	-.116	-.072	-.115	.021	-.048	-.078	-.009	.025	-.146	-.128	.093	-.054	-.202	-.142	.061	.037	-.029
50	-.047	-.066	-.010	.009	.004	-.022	-.109	.034	.003	-.071	-.082	-.071	-.071	-.059	-.152	-.130	-.100	-.085	-.123	.008	-.063	-.063	.006	.003	-.150	-.121	.102	-.087	-.216	-.164	.052	.033	-.045
51	.011	-.048	-.069	.045	-.031	-.081	.044	-.101	.062	-.115	-.100	-.115	-.115	-.062	-.050	-.060	-.003	-.028	-.047	-.021	-.037	-.001	.080	-.055	-.062	-.001	.070	-.102	-.068	-.083	-.018	.004	-.063

APPENDIX O-12
CORRELATION MATRIX OF RELATIONSHIP FOR VARIABLES
20 THROUGH 51 WITH VARIABLES
68 THROUGH 100 FOR NORMAL MALE

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
20	.005	.041	-.033	.074	-.036	-.067	.057	-.024	-.156	-.072	-.072	-.072	-.072	-.010	-.010	-.011	.125	-.041	.054	-.021	-.020	.067	.010	-.093	-.013	.000	.013	-.020	.083	.065	-.016	-.074	-.043
21	-.079	-.066	-.078	.094	-.098	-.070	.061	.046	-.136	-.036	-.036	-.036	-.036	-.014	.094	.064	.012	-.084	.011	-.036	.034	.019	-.048	.049	.006	.000	-.006	-.004	.150	.105	-.023	.003	-.044
22	.063	.041	-.118	.149	-.110	-.151	.115	.040	-.099	-.029	-.029	-.029	-.029	-.041	.045	.016	.083	-.101	.019	.038	.005	.039	-.034	-.024	-.062	.000	.062	-.030	.089	.055	.000	-.035	.054
23	.006	.028	.022	.078	-.057	.010	-.008	.080	-.152	.085	-.085	-.085	-.085	-.071	-.016	-.041	.121	-.145	-.008	-.061	-.032	-.050	.017	.075	-.052	.000	.052	-.119	.058	-.003	.064	.095	.157
24	-.051	-.017	.010	-.058	.062	.001	.008	-.036	.069	-.021	-.021	-.021	-.021	.078	.024	.049	-.164	.162	-.006	.043	.025	-.011	.048	-.074	.074	.000	-.074	.118	-.040	.017	-.049	-.086	-.140
25	-.064	.033	.059	-.062	.022	-.028	.020	-.101	.187	.171	.171	.171	.171	.038	-.007	.010	-.039	.069	.009	.062	.029	.075	-.049	-.055	.014	.000	-.014	.075	-.067	-.025	-.061	-.088	-.134
26	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
27	-.003	-.039	.119	-.066	.118	.066	.090	.005	-.100	-.043	-.043	-.043	-.043	-.072	-.055	-.070	-.036	-.030	-.072	.065	-.052	-.103	.124	-.018	.026	.000	-.026	-.048	-.072	-.084	-.041	-.020	-.035
28	.012	-.020	.080	-.063	.087	.054	.053	-.004	-.128	-.039	-.039	-.039	-.039	.089	.041	.067	-.006	.053	.054	.068	-.036	-.047	.058	-.018	-.061	.000	.061	.060	.063	.071	.022	.030	.038
29	.006	-.031	.108	-.071	.111	.065	.077	.000	-.127	-.045	-.045	-.045	-.045	.018	-.002	.006	-.022	.017	-.003	.074	-.047	-.080	.097	-.020	-.024	.000	.024	.013	.003	.001	.007	.008	.005
30	.033	.012	-.019	-.055	.030	.001	.066	.004	.140	-.097	-.097	-.097	-.097	-.091	-.019	-.051	.051	-.037	-.012	-.045	-.070	.000	-.046	.017	.009	.000	-.009	-.164	-.021	-.115	-.079	.031	.093
31	.048	-.038	-.045	-.059	-.013	.021	.056	-.010	.130	-.074	-.074	-.074	-.074	-.084	-.049	-.071	.052	-.020	-.014	-.014	-.030	-.006	-.040	.033	-.004	.000	.004	-.156	-.069	-.147	-.109	.067	.133
32	.042	.060	-.046	-.078	-.048	.073	.061	-.044	.030	.017	.017	.017	.017	-.052	-.077	-.078	.001	-.011	-.045	.014	.076	-.007	-.038	.068	-.070	.000	.070	-.098	-.137	-.157	.090	.086	.109
33	.105	.058	.035	-.101	+.063	.067	.257	.077	.044	-.061	-.061	-.061	-.061	-.006	.049	.033	-.036	-.093	-.045	-.076	-.087	.007	-.032	.007	.017	.000	-.017	-.114	-.038	-.083	.065	.132	.097
34	.111	.082	-.052	-.006	-.037	-.012	.187	.081	.079	-.028	-.028	-.028	-.028	-.080	-.021	-.048	.028	-.077	-.043	-.033	-.071	-.027	-.025	.060	.016	.000	-.016	-.209	-.060	-.146	.074	.204	.150
35	.048	.071	-.065	.080	-.077	-.065	.002	.038	.089	.047	.047	.047	.047	-.158	-.143	-.170	.126	-.020	-.024	.067	-.017	-.064	.012	.088	.008	.000	-.008	-.229	-.112	-.186	.040	.199	.165
36	.008	.043	-.089	-.014	-.042	-.037	.017	-.054	.017	-.085	-.085	-.085	-.085	-.092	-.036	-.064	.026	-.098	-.061	.037	-.087	-.092	-.006	.124	-.071	.000	.071	-.056	.016	-.020	-.045	-.038	-.072
37	.091	.049	-.090	-.020	-.038	-.037	.008	-.061	.034	-.079	-.079	-.079	-.079	-.095	-.027	-.058	.033	-.085	-.048	.044	-.087	-.083	-.010	.114	-.076	.000	.076	-.054	.014	-.022	-.040	-.039	-.066
38	.035	.050	.027	-.069	.046	-.012	-.096	-.098	.166	.061	.061	.061	.061	-.026	.070	.041	.064	.120	.111	.072	.023	.090	-.050	-.070	-.042	.000	.042	.037	-.017	-.009	.059	-.054	.023
39	.049	-.025	-.106	.041	-.146	.001	.116	.000	.063	-.041	-.041	-.041	-.041	-.080	-.042	-.063	-.096	-.164	-.164	.018	-.049	-.051	.021	.031	-.044	.000	.044	-.113	-.046	-.090	.039	-.028	-.047
40	.037	-.025	-.140	.042	-.141	-.041	.102	-.032	.105	-.017	-.017	-.017	-.017	-.081	-.032	-.057	-.076	-.107	-.124	.038	-.055	-.057	.042	.013	-.022	.000	.022	-.081	-.045	-.075	.024	-.019	-.035
41	-.038	.002	-.063	-.007	.023	-.084	-.095	-.110	.140	.072	.072	.072	.072	-.026	-.027	-.031	.060	.140	.078	.069	-.011	-.020	.060	-.048	.068	.000	-.068	.095	-.044	.011	-.052	.003	.034
42	-.026	-.009	.020	-.006	-.003	.029	.044	.001	.143	-.165	-.165	-.165	-.165	-.165	.038	.024	.008	-.023	-.018	-.072	.080	.060	-.108	.073	-.003	.000	.003	-.037	-.063	-.064	.061	-.019	-.062
43	.005	.034	.010	-.042	.021	.028	.049	.018	.212	-.149	-.149	-.149	-.149	.020	-.010	.001	.009	-.021	-.004	-.044	.061	.043	-.065	.061	-.004	.000	.004	-.035	-.040	-.046	.101	-.010	-.037
44	.061	.065	-.022	-.043	.030	-.013	-.030	.010	.101	.078	.078	.078	.078	-.005	.018	.012	-.007	.035	.016	.039	-.104	-.032	.086	-.045	-.002	.000	.002	.001	.012	.008	.065	.014	.046
45	.024	-.032	-.014	-.012	-.070	.069	-.084	-.034	.187	.042	.042	.042	.042	-.068	.017	-.015	.058	-.097	-.014	.028	-.055	.030	-.022	.008	-.093	.000	.093	-.103	.049	-.037	.038	-.028	-.054
46	.049	.009	-.096	.069	-.129	-.033	-.053	-.054	.127	.086	.086	.086	.086	-.004	.023	.016	.011	-.100	-.028	.093	-.094	.013	.048	-.048	-.072	.000	.072	-.037	.055	.015	.082	-.042	-.047
47	.035	.049	-.067	.061	-.043	-.083	.023	-.044	-.046	.060	.060	.060	.060	.077	.023	.048	-.038	-.036	-.013	.086	-.045	-.019	-.086	-.070	-.012	.000	.012	.060	.029	.054	.067	.023	.042
48	.107	.151	-.034	-.002	.010	-.045	-.000	-.013	.183	.103	.103	.103	.103	-.025	-.081	-.070	.057	.085	.032	.104	-.070	.030	.001	-.047	.023	.000	-.023	.007	-.081	-.061	.076	.035	.072
49	.062	.013	-.074	-.012	-.078	.013	.105	-.039	.113	-.128	-.128	-.128	-.128	-.070	-.033	-.052	-.025	-.126	-.098	-.021	-.041	-.028	-.047	.093	-.047	.000	.047	-.110	-.034	-.083	.043	-.011	-.050
50	.081	.042	-.125	-.004	-.095	-.030	.089	-.048	.153	-.095	-.095	-.095	-.095	-.085	-.026	-.054	-.002	-.108	-.078	.016	-.062	.048	-.002	.084	-.027	.000	.027	-.115	-.026	-.081	.058	.006	-.023
51	.051	.082	-.142	.031	-.058	-.120	-.056	-.040	.128	.111	.111	.111	.111	-.051	.006	-.016	.071	.047	.054	.108	-.061	-.082	.127	-.020	.065	.000	-.065	-.026	.020	-.000	.004	.057	.080

APPENDIX P

I. Description of Variables as Presented on Data File Record Layout

II. Correlation Coefficient Tables:

Appendix P-1	Correlations of 80 Predictor Variables with Seven Accident violation Criterion Variables Group EMR Total
Appendix P-2	Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group EMR Males
Appendix P-3	Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group EMR Females
Appendix P-4	Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group Normal Total
Appendix P-5	Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group Normal Male
Appendix P-6	Correlations of 80 Predictor Variables with Seven Accident Violation Criterion Variables Group Normal Female
Appendix P-7	Summary of Predictor Variables Significant at .05 Level of Confidence
Appendix P-8	Summary of Number of Correlation Coefficient (of 80 Predictors With Seven Criteria) Statistically Significant at the .05 Level of Confidence by Group

NOTE: Total subjects reflected for each of the following zero order correlation indicate minor discrepancy.

APPENDIX P-1

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-TOTAL EMR's

VARIABLES NUMBER	151	152	153	154	155	156	157
6	.038	.023	.022	.021	.039	.029	.046
7	.054	.032	.031	.030	.055	.040	.065
8	.054	.032	.031	.030	.055	.040	.065
9	.038	.023	.022	.021	.039	.029	.046
10	.038	.023	.022	.021	.039	.029	.046
11	-.222*	-.142*	-.155*	-.159*	-.205*	-.201*	-.233*
12	-.114*	-.001	-.115*	-.014	-.108*	-.049	-.065
13	-.027	.032	-.080	.030	-.025	-.052	-.012
14	-.040	-.019	-.052	-.033	-.041	-.060	-.041
15	-.091	-.045	-.117*	-.101	-.078	-.117*	-.078
16	.131*	.098	.111*	.053	.122*	.092	.149*
17	-.012	-.038	.039	.075	-.020	.059	-.045
18	-.051	-.025	-.064	-.068	-.036	-.056	-.036
19	-.001	-.013	.003	-.008	.009	-.037	-.025
20	-.063	-.106	-.055	-.070	-.083	-.052	-.113*
21	-.055	-.112*	-.123*	-.045	-.067	-.076	-.118*
22	-.050	-.041	-.076	-.035	-.058	-.044	-.066
23	-.023	-.062	-.082	-.031	-.029	-.045	-.082
24	.069	.018	.036	.041	.079	.036	.116*
25	-.067	.100	.065	-.005	-.067	.013	-.009
26	.054	.032	.031	.030	.055	.040	.065
27	-.003	-.038	-.019	-.049	-.000	-.042	-.007
28	-.038	-.032	.031	-.108*	-.011	-.037	-.027
29	-.033	-.048	-.008	-.087	-.020	-.055	-.035
30	.037	-.037	.090	-.091	.039	.024	.005
31	-.022	-.070	.079	-.152*	-.016	-.020	-.049
32	-.051	-.061	.011	[illegible]*	-.050	-.064	-.086
33	-.009	-.015	.043	[illegible]	.001	.014	.001
34	-.072	-.108*	-.000	-.177*	-.067	-.068	-.089
35	-.085	-.105	-.032	-.165*	-.091	-.106	-.123*
36	.068	.072	.116*	-.031	.092	.088	.082
37	.055	.060	.105	-.038	.079	.077	.069
38	.010	-.066	.057	-.047	.008	.025	-.006
39	-.012	.029	.081	.005	.004	.089	-.001
40	-.011	-.014	.069	-.035	.006	.051	-.018
41	-.026	-.115*	-.011	-.095	-.023	-.081	-.073
42	.023	.043	.109	-.014	.042	.044	-.013
43	-.009	-.008	.073	-.054	.011	-.006	-.059
44	-.077	-.094	-.093	-.063	-.082	-.104	-.086
45	-.006	-.025	.035	.026	.013	.034	-.046
46	-.040	-.093	-.016	-.039	-.028	-.024	-.086
47	-.052	-.085	-.037	-.077	-.059	-.052	-.069
48	-.118*	-.138*	-.042	-.134*	-.114*	-.103	-.128*
49	.034	.049	.135*	-.032	.062	.089	.027
50	-.000	-.012	.095	-.093	.024	.031	-.022
51	-.075	-.152*	-.051*	-.171*	-.084	-.125*	-.121*
68	-.068	.051	-.091	.047	.066	-.054	-.044
69	.013	.023	-.030	.067	.016	.008	.043
70	-.044	-.089	-.037	-.071	-.058	-.092	-.083

*The significance at the .05 level = .107, N=350

APPENDIX P-1a

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-TOTAL EMR's

VARIABLES NUMBER	151	152	153	154	155	156	157
71	.069	-.001	.037	.060	.053	.072	.038
72	-.085	-.101	-.081	-.096	-.100	-.135*	-.128*
73	-.027	.014	.008	-.034	-.009	-.027	.010
74	.019	.045	-.035	.042	.021	-.008	.038
75	-.066	.039	-.052	-.056	-.064	-.026	-.047
76	.040	.055	.043	.071	.050	.041	.038
77	.123*	.072	.070	.067	.125*	.091	.148*
78	.129*	.076	.073	.071	.131*	.096	.155*
79	.123*	.072	.070	.067	.125*	.091	.148*
80	.123*	.072	.070	.067	.125*	.091	.148*
81	.164*	.121*	.126*	.143*	.179*	.165*	.190*
82	.024	.046	.014	.084	.022	.063	.063
83	.094	.087	.070	.122	.100	.119*	.132*
84	.080	.001	.044	.087	.084	.066	.091
85	.057	.080	.077	.058	.061	.019	.090
86	.105	.076	.085	.127*	.112*	.094	.140*
87	.013	.072	-.030	.067	.016	.008	.043
88	.022	.053	-.040	.009	.027	-.019	.018
89	.105	.111*	-.022	.071	.093	.034	.115*
90	-.056	-.061	.018	-.052	-.060	.002	-.068
91	-.015	-.002	.061	.066	.026	.024	.044
92	.035	.086	.025	.074	.041	.085	.093
93	.068	.079	-.015	.074	.071	.024	.098
94	.008	-.046	-.041	-.035	.003	-.085	-.040
95	.056	.136*	.065	.148*	.067	.126*	.093
96	.022	.067	.002	.131*	.024	.067	.061
97	.057	.121*	.044	.176*	.065	.122*	.105
98	-.061	.040	-.076	-.104	-.071	-.129*	-.106
99	-.227*	-.072	-.125*	-.073	-.240*	-.122*	-.209*
100	-.166*	-.044	-.142	-.100	-.175*	-.171*	-.190*
150	.001	-.008	.057	-.054	.008	-.004	-.018

The significance at the .05 level = .107, N=350

APPENDIX P-2

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-EMR MALES

VARIABLES NUMBER	151	152	153	154	155	156	157
6	.043	.026	.024	.025	.044	.033	.052
7	.061	.036	.035	.035	.063	.047	.074
8	.061	.036	.035	.035	.063	.047	.074
9	.043	.026	.024	.025	.044	.033	.052
10	.043	.026	.024	.025	.044	.033	.052
11	-.215*	-.161*	-.169*	-.176*	-.196*	-.221*	-.233*
12	-.103	-.016	-.068	-.023	-.098	-.005	-.055
13	-.025	.036	-.081	.035	-.023	-.050	-.009
14	-.013	-.023	-.033	-.041	-.015	-.048	-.016
15	-.079	-.070	-.078	-.111	-.064	-.087	-.080
16	.113	.104	.073	.043	.103	.053	.139*
17	-.014	-.016	.026	.099	-.023	.058	-.038
18	-.067	-.047	-.044	-.071	-.049	-.038	-.065
19	.046	.012	.049	.000	.055	.002	.011
20	-.018	-.090	-.036	-.048	-.040	-.022	-.066
21	-.056	-.092	-.128*	-.025	-.068	-.063	-.113
22	-.035	-.019	-.082	-.016	-.043	-.034	-.041
23	-.018	-.030	-.083	-.022	-.025	-.035	-.062
24	.077	-.018	.040	.038	.089	.036	.107
25	-.084	.085	.062	-.016	-.083	-.001	-.032
26	.043	.026	.024	.025	.044	.033	.052
27	-.051	-.028	.003	-.039	-.046	-.019	-.047
28	-.038	-.026	.065	-.095	-.003	-.006	-.026
29	-.071	-.043	.020	-.080	-.053	-.031	-.068
30	.046	-.011	.116*	-.070	.051	.053	.022
31	.005	-.059	.116*	-.126*	.013	.019	-.027
32	-.017	-.046	.037	-.101	-.016	-.040	-.053
33	-.014	-.022	.037	-.091	-.002	.006	-.007
34	-.045	-.102	.021	-.154*	-.039	-.039	-.067
35	-.043	-.097	-.008	-.142	-.048	-.077	-.087
36	.070	.057	.110	-.059	.097	.068	.077
37	.054	.043	.098	-.068	.081	.055	.061
38	.006	-.072	.063	-.056	.004	.024	-.010
39	-.060	.012	.049	-.020	-.042	.052	-.053
40	-.046	-.030	.039	-.063	-.028	.013	-.056
41	-.001	-.112	-.004	-.102	.003	-.085	-.044
42	.039	.053	.086	-.018	.061	.016	.000
43	-.003	-.008	.052	-.059	.019	-.031	-.059
44	-.092	-.116*	-.079	-.067	-.098	-.094	-.110
45	.003	-.005	.017	.031	.024	.021	-.028
46	-.028	-.080	-.030	-.043	-.014	-.037	-.064
47	-.043	-.084	-.034	-.082	-.051	-.051	-.056
48	-.139*	-.145*	-.043	-.147*	-.135*	-.112	-.145*
49	.028	.043	.111	-.051	.059	.058	.016
50	-.003	-.022	.080	-.109	.025	.007	-.031
51	-.062	-.165*	-.034	-.174*	-.072	-.114*	-.117*
68	-.066	.045	-.052	.043	-.063	-.022	-.045
69	.050	.025	.019	.075	.053	.054	.080
70	-.019	-.069	-.024	-.051	-.035	-.076	-.052

The significance at the .05 level = .113, N=300

APPENDIX P-2a

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-EMR MALES

VARIABLES NUMBER	151	152	153	154	155	156	157
72	-.058	-.079	-.070	-.077	-.075	-.120*	-.095
73	-.000	.014	.015	-.014	.020	-.014	.032
74	.005	.045	-.052	.043	.007	-.022	.023
75	-.111	.036	-.081	-.080	-.109	-.050	-.092
76	.082	.076	.082	.063	.093	.065	.093
77	.124	.074	.070	.071	.127*	.094	.150*
78	.132*	.078	.074	.075	.135*	.100	.160*
79	.124*	.074	.070	.071	.127*	.094	.150*
80	.124*	.074	.070	.071	.127*	.094	.150*
81	.153*	.110	.143*	.123	.171*	.166*	.179*
82	.010	.031	.007	.057	.007	.045	.053
83	.076	.070	.069	.094	.082	.105	.117*
84	.075	-.028	.062	.074	.078	.074	.074
85	.074	.079	.102	.066	.079	.033	.103
86	.104	.052	.107	.111	.110	.098	.131*
87	.008	.078	-.036	.075	.012	.008	.041
88	.040	.030	-.015	-.012	.046	-.006	.018
89	.091	.130	-.028	.065	.076	.029	.111
90	-.053	-.106	.026	-.060	-.058	.005	-.095
91	-.023	-.008	.060	.058	.020	.016	.039
92	.015	.076	.034	.069	.022	.096	.073
93	.057	.064	-.007	.061	.060	.025	.081
94	.014	-.051	-.042	-.044	.009	-.094	-.037
95	.069	.136*	.094	.133*	.080	.144*	.109
96	.037	.067	.010	.130*	.038	.074	.082
97	.069	.114*	.062	.167*	.077	.134*	.119*
98	-.060	.041	-.083	-.104	-.071	-.137*	-.114*
99	-.201*	-.070	-.118*	-.059	-.216*	-.107	-.185*
100	-.141*	-.042	-.129*	-.090	-.151*	-.156*	-.173*
150	.033	-.009	.086	-.048	.041	.020	.007

The significance at the .05 level = .113, N=300

APPENDIX P-3

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-EMR FEMALES

VARIABLES NUMBER	151	152	153	154	155	156	157
6	-.209*	-.075	-.110	.000	-.209	-.110	-.231
7	-.114	.007	.068	.000	-.114	.068	-.100
8	-.352*	.133	-.039	.000	-.352*	-.039	-.249
9	-.256	-.112	-.180	.000	-.256	-.180	-.294*
10	-.151	.235	-.089	.000	-.151	-.089	-.010
11	-.308*	.005	-.061	.000	-.308	-.061	-.279*
12	-.219	.076	-.456*	.000	-.219	-.456*	-.158
13	.000	.000	.000	.000	.000	.000	.000
14	-.263	-.007	-.217	.000	-.263	-.217	-.244
15	-.187	.178	-.428*	.000	-.187	-.428*	-.074
16	.219	-.076	.456*	.000	.219	.456*	.158
17	.065	-.145	.177	.000	.065	.177	-.020
18	.079	.185	-.208	.000	.079	-.208	.173
19	-.331	.086	-.392*	.000	-.331	-.392*	-.256
20	-.231	-.108	-.102	.000	-.231	-.102	-.269
21	-.064	-.173	-.028	.000	.064	.028	-.036
22	-.041	-.115	.027	.000	-.041	.027	-.099
23	.005	-.277*	-.046	.000	.005	-.046	-.146
24	-.022	.300	-.013	.000	-.022	-.013	.143
25	-.020	.178	.051	.000	-.020	.051	.079
26	.073	.037	.043	.000	.073	.043	.087
27	.247	-.028	-.073	.000	.247	-.073	.211
28	.079	.049	-.087	.000	.079	-.087	.099
29	.203	-.003	-.081	.000	.203	-.081	.184
30	.145	-.122	-.005	.000	.145	-.005	.067
31	-.006	.075	-.093	.000	-.006	-.093	.036
32	-.145	-.057	-.090	.000	-.145	-.090	-.163
33	.026	.062	.099	.000	.026	.099	.058
34	-.099	.085	-.070	.000	-.099	-.070	-.044
35	-.200	.039	-.084	.000	-.200	-.084	-.162
36	-.046	.092	.109	.000	-.046	.109	.008
37	-.045	.087	.096	.000	-.045	.096	.006
38	-.026	-.081	-.122	.000	-.026	-.122	-.068
39	.189	.043	.256	.000	.189	.256	.196
40	.104	-.017	.216	.000	.104	.216	.086
41	-.163	-.144	-.041	.000	-.163	-.041	-.226
42	-.099	-.050	.283	.000	-.099	.283*	-.118
43	-.063	-.018	.255	.000	-.063	.255	-.067
44	.034	.103	-.194	.000	.034	-.194	.086
45	-.056	-.202	.191	.000	-.056	.191	-.161
46	-.120	-.210	.086	.000	-.120	.086	-.223
47	-.103	-.093	-.054	.000	-.103	-.054	-.144
48	.028	-.085	-.041	.000	.028	-.041	-.020
49	-.003	.021	.274	.000	-.003	.274*	.009
50	-.032	.032	.200	.000	-.032	.200	-.012
51	-.097	.018	-.144	.000	-.097	-.144	-.079
68	-.151	.053	-.315*	.000	-.151	-.315*	-.110
69	-.285*	.037	-.484*	.000	-.285*	-.484*	-.240
70	-.073	-.123	-.043	.000	-.073	-.043	-.133
71	.183	-.145	.004	.000	.183	.004	.088

*The significance at the .05 level = .273, N=50

206

APPENDIX P-3a

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-EMR FEMALES

VARIABLES NUMBER	151	152	153	154	155	156	157
72	-.139	-.159	-.082	.000	-.139	-.082	-.213
73	-.103	.170	.036	.000	-.103	.036	-.002
74	.073	.037	.043	.000	.073	.043	.087
75	.073	.037	.043	.000	.073	.043	.087
76	-.295*	-.185	-.269	.000	-.295*	-.269	-.370*
77	.104	.053	.062	.000	.104	.062	.124
78	.104	.053	.062	.000	.104	.062	.124
79	.104	.053	.062	.000	.104	.062	.124
80	.104	.053	.062	.000	.104	.062	.124
81	.085	.048	-.038	.000	.085	-.038	.104
82	-.076	-.022	-.054	.000	-.076	-.054	-.082
83	.017	.020	-.041	.000	.017	-.041	.026
84	.010	.175	-.198	.000	.010	-.198	.104
85	-.041	.110	-.083	.000	-.041	-.083	.022
86	-.020	.122	-.150	.000	-.020	-.150	.048
87	.073	.037	.043	.000	.073	.043	.087
88	-.152	.121	-.244	.000	-.152	.244	-.073
89	.131	-.082	-.034	.000	.131	-.034	.075
90	-.104	.378*	-.062	.000	-.104	-.062	.110
91	.000	.000	.000	.000	.000	.000	.000
92	.087	.113	-.070	.000	.087	-.070	.140
93	.035	.095	-.116	.000	.035	-.116	.083
94	-.104	-.053	-.062	.000	-.104	-.062	-.124
95	-.158	.016	-.179	.000	-.158	-.179	-.136
96	-.147	-.007	-.103	.000	-.147	-.103	-.138
97	-.149	.050	-.149	.000	-.149	-.149	-.109
98	-.038	.084	.041	.000	-.038	.041	.011
99	-.351*	.036	-.123	.000	-.351*	-.123	-.300*
100	-.311*	.055	-.221	.000	-.311*	-.221	-.254
150	-.219	.076	-.183	.000	-.219	-.183	-.158

*The significance at the .05 level = .273, N=50

APPENDIX P-4

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-NORMAL TOTAL

VARIABLES NUMBER	151	152	153	154	155	156	157
6	-.093	-.134*	-.101	-.157*	-.096*	-.183*	-.168*
7	.000	-.101*	-.049	-.103*	-.007	-.101*	-.030
8	-.005	-.095*	-.036	-.094*	-.006	-.080	-.020
9	.011	.035	.012	.026	.014	.030	.028
10	-.019	.031	.045	-.073	-.016	.010	-.006
11	.041	-.080	-.048	-.087	.036	-.090	-.016
12	.094*	.051	-.035	-.026	.092	-.043	.085
13	.053	.092	-.082	.112*	.037	.011	.086
14	-.033	.058	-.040	.072	-.030	.014	.002
15	.009	.056	.037	.071	.014	.067	.035
16	.062	-.039	-.015	-.028	.055	-.035	.037
17	-.089	-.028	-.033	-.062	-.088	-.048	-.095*
18	.042	.003	.081	.005	.045	.059	.037
19	.031	-.041	.015	-.012	.035	-.003	-.051
20	.048	-.083	.052	-.027	.049	.032	.036
21	.017	-.058	.013	.000	.021	.016	.022
22	-.009	-.047	.023	-.007	-.024	.020	-.011
23	.013	-.043	.080	-.046	-.006	.037	-.034
24	-.025	.075	-.048	.050	-.004	-.009	.020
25	-.000	.010	-.085	.036	.009	-.050	.035
26	.018	.032	.035	.026	.020	.043	.026
27	-.024	-.044	-.012	-.070	-.042	-.060	-.058
28	-.035	-.018	.043	-.078	-.044	-.010	-.067
29	-.035	-.049	.003	-.099*	-.049	-.050	-.071
30	-.003	.040	.035	-.010	-.004	.013	.002
31	.015	-.003	.039	-.035	.008	-.007	-.002
32	.035	-.091	.030	-.074	.021	-.039	-.011
33	-.020	-.050	-.062	-.061	-.069	-.058	-.074
34	-.038	-.072	-.042	-.071	-.088	-.049	-.086
35	-.052	-.058	-.001	-.032	-.068	-.023	-.063
36	-.096*	.084	.022	.126*	-.080	.077	-.009
37	-.087	.093	.035	.132*	-.070	.090	.002
38	.062	.075	.104*	.072	.077	.106*	.090
39	-.023	.063	.000	.118*	-.043	.079	-.009
40	-.008	.061	.025	.125*	-.023	.096*	.010
41	.030	-.014	.080	.032	.043	.051	.037
42	-.035	-.003	.035	.056	-.018	.035	-.011
43	-.044	.045	.031	.066	-.024	.035	-.011
44	.005	.097*	-.007	.009	.009	-.007	.013
45	.018	.022	.129*	.017	.034	.111*	.038
46	.036	.068	.127*	.067	.048	.141*	.095*
47	.036	.075	.026	.076	.034	.064	.084
48	.008	.055	.094*	.019	.009	.067	.026
49	-.067	.049	.021	.105*	-.068	.070	-.025
50	-.059	.056	.046	.104*	-.060	.088	-.014
51	.020	.019	.063	.021	.018	.053	.035
68	-.038	.032	.035	.026	-.036	.043	-.029
69	-.094*	.032	-.043	.026	-.092	-.024	-.085
70	-.010	.066	.090	-.008	.035	.066	.024

*The significance at the .05 level = .094, N=446

APPENDIX P-4a

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-NORMAL TOTAL

VARIABLES NUMBER	151	152	153	154	155	156	157
71	-.088	-.059	-.075	-.000	-.104	-.058	-.067
72	.033	.066	.084	-.009	.056	.066	.036
73	.058	.057	.079	.002	.077	.056	.051
74	-.054	.018	.020	.015	-.053	.025	-.049
75	-.186*	-.131*	-.106*	-.183*	-.190*	-.202*	-.250*
76	-.004	.064	.027	.044	.009	.044	.023
77	.085	.037	.040	.030	.087	.050	.094*
78	.085	.037	.040	.030	.087	.050	.094*
79	.085	.037	.040	.030	.087	.050	.094*
80	.085	.037	.040	.030	.087	.050	.094
81	.042	.018	.020	.015	.044	.025	.047
82	.042	.018	.020	.015	.044	.025	.047
83	.042	.018	.020	.015	.044	.025	.047
84	.042	.018	.020	.015	.044	.025	.047
85	.042	.018	.020	.015	.044	.025	.047
86	.042	.018	.020	.015	.044	.025	.047
87	.042	.018	.020	.015	.044	.025	.047
88	.042	.018	.020	.015	.044	.025	.047
89	.042	.018	.020	.015	.044	.025	.047
90	.042	.018	.020	.015	.044	.025	.047
91	.042	.018	.020	.015	.044	.025	.047
92	.042	.018	.020	.015	.044	.025	.047
93	.042	.018	.020	.015	.044	.025	.047
94	.042	.018	.020	.015	.044	.025	.047
95	-.033	.022	.031	.030	-.030	.050	-.035
96	-.003	.018	.080	.033	.001	.063	-.024
97	-.012	.016	.070	.006	-.008	.076	-.024
98	-.023	.040	.066	.044	-.030	.078	-.029
99	-.072	-.051	-.030	-.110*	-.076	-.083	-.088
100	.011	.018	.036	-.050	.003	-.001	-.001
150	-.015	-.019	-.068	-.054	-.032	-.108*	-.083

*The significance at the .05 level = .094, N=446

APPENDIX P-5

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-NORMAL MALE

VARIABLES NUMBER	151	152	153	154	155	156	157
6	-.086	-.137*	-.119	-.205*	-.083	-.233*	-.187*
7	-.007	-.057	-.049	-.040	-.012	-.056	-.015
8	-.023	-.024	.029	.024	-.021	.057	.024
9	-.004	.053	-.018	.011	.003	-.008	.025
10	-.002	.026	.060	-.069	.010	.021	.013
11	.161*	-.089	-.068	-.132*	.165*	-.130*	.082
12	.074	-.030	-.030	-.025	.072	-.040	.063
13	.063	.081	-.099	.143*	.043	.028	.108
14	-.078	-.002	.022	.072	.067	.054	-.016
15	.043	.053	.076	.084	.051	.103	.096
16	.055	.013	-.014	.024	.058	.012	.056
17	-.116	-.084	-.084	-.136*	-.130*	-.147*	-.186*
18	.128*	.059	.059	.014	.125*	.054	.120
19	.003	.014	.014	-.008	.009	-.004	-.069
20	.018	-.131*	.078	-.014	.015	.078	.005
21	-.005	-.124	-.056	-.037	-.015	-.048	-.020
22	-.019	-.128*	-.022	-.070	-.039	-.025	-.033
23	-.033	-.082	.088	-.095	-.058	.021	-.112
24	.038	.137*	-.084	.100	.059	-.018	.108
25	.007	.011	-.065	.066	.030	-.015	.075
26	.000	.000	.000	.000	.000	.000	.000
27	-.050	-.132*	-.080	-.163	-.074	-.160*	-.132*
28	.058	-.062	.070	-.116	.046	-.007	-.011
29	.010	-.103	.003	-.151*	-.009	-.083	-.072
30	.019	.074	.031	.009	.019	.028	.055
31	.046	.043	.031	-.010	.038	-.008	.047
32	.073	-.037	.033	-.050	.055	-.054	.014
33	-.031	-.061	-.117	-.085	-.112	-.098	-.115
34	-.026	-.071	-.062	-.074	-.107	-.049	-.088
35	-.053	-.049	.039	-.025	-.072	.015	-.044
36	-.151	-.021	-.009	.077	-.121	.029	-.044
37	-.138	.032	.001	.084	-.107	.040	-.029
38	.102	.098	.094	.078	.116	.103	.141
39	-.056	-.000	-.090	.073	-.091	-.018	-.056
40	-.022	-.008	-.062	.078	-.048	-.007	-.018
41	.047	-.053	.053	-.003	.066	.001	.042
42	-.078	.012	-.015	.042	-.073	-.015	-.054
43	-.081	.065	-.029	.039	-.076	-.039	-.055
44	.011	.102	-.004	-.009	.016	-.027	.009
45	-.012	.046	.158*	.009	.003	.105	.002
46	.058	.062	.141*	.074	.067	.131*	.130*
47	.089	.018	.017	.080	.088	.052	.147*
48	.060	.097	.130*	.015	.060	.076	.086
49	-.115	.010	-.048	.059	-.125*	-.009	-.074
50	-.092	.017	-.033	.059	-.102	-.003	-.045
51	.040	.022	.044	.013	.043	.022	.064
68	-.074	.030	.030	.025	-.072	.040	-.063
69	-.105	.042	-.080	.035	-.102	-.046	-.089
70	-.101	.084	.084	-.032	-.069	.033	-.088

*The significance at the .05 level = .125, N=244

APPENDIX ~~P-1a~~

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-NORMAL MALE

VARIABLES NORMAL	151	152	153	154	155	156	157
71	-.001	-.045	-.096	.003	-.021	-.066	.038
72	-.050	.091	.091	-.034	-.022	.045	-.060
73	-.054	.037	.084	-.002	-.030	.050	-.066
74	-.124	-.117	-.103	-.106	-.135*	-.117	-.138*
75	-.151*	-.134*	-.111	-.230*	-.149*	-.244*	-.241*
76	-.063	.076	-.016	.031	-.037	.005	-.009
77	.100	.052	.052	.043	.103	.070	.117
78	.100	.052	.052	.043	.103	.070	.117
79	.100	.052	.052	.043	.103	.070	.117
80	.100	.052	.052	.043	.103	.070	.117
81	.066	-.015	.059	.009	.069	.055	.033
82	.026	-.007	.015	-.042	.023	-.033	-.008
83	.046	-.011	.035	-.028	.045	-.002	.007
84	.050	.064	.170*	.020	.065	.135*	.053
85	.124	.072	.069	.032	.134*	.073	.127*
86	.106	.062	.150*	.010	.119	.111	.088
87	.053	.080	.014	.067	.059	.052	.081
88	.015	.041	-.070	.017	.023	-.059	.007
89	-.050	-.036	.062	.036	-.041	.066	-.048
90	.071	-.024	-.024	-.071	.065	-.063	.041
91	.017	.113	-.060	.048	.012	-.007	.061
92	-.083	-.026	-.026	-.048	-.078	-.066	-.061
93	.000	.000	.000	.000	.000	.000	.000
94	.083	.026	.026	.048	.078	.066	.061
95	-.013	-.029	.016	.009	-.003	.023	-.020
96	.049	-.005	.116	-.063	.057	.063	.006
97	.025	-.043	.079	-.036	.038	.055	-.006
98	.024	.020	.044	.035	.005	.058	-.001
99	-.135*	-.073	-.029	-.129*	-.132*	-.101	-.140*
100	-.014	.002	.076	-.067	-.014	.015	-.015
150	.009	.004	-.047	-.085	.017	-.116	-.069

The significance at the .05 level = .125, N=244

APPENDIX P-6

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-NORMAL FEMALES

VARIABLES NUMBER	151	152	153	154	155	156	157
6	-.110	-.062	-.039	.035	-.119	-.024	-.125
7	.014	.008	.080	-.058	.011	.036	.015
8	.012	.062	-.009	-.045	.024	-.012	.019
9	.029	-.024	.037	.021	.025	.055	.022
10	-.038	.049	.028	-.082	-.046	.003	-.025
11	-.109	-.076	-.021	-.012	-.125	-.037	-.140
12	.113	.162	-.037	-.021	.111	-.041	.109
13	.044	.036	-.103	-.039	.030	-.107	.036
14	.029	.119	-.162	.012	.018	-.114	.007
15	-.029	.016	-.034	-.002	-.029	-.033	-.049
16	.070	-.055	.012	-.047	.054	-.032	.039
17	-.055	.054	.034	.069	-.034	.094	.017
18	-.059	-.093	.112	-.014	-.049	.069	-.062
19	.089	-.162*	.037	.021	.091	.041	-.008
20	.080	.027	.041	-.002	.087	.017	.084
21	.047	.054	.115	.073	.067	.118	.076
22	.003	.085	.085	.116	-.006	.090	.015
23	.066	.063	.091	.097	.056	.110	.070
24	-.100	-.063	-.017	-.091	-.080	-.038	-.096
25	-.007	-.029	-.131	-.057	-.014	-.143*	-.021
26	.027	.035	.046	.025	.029	.050	.031
27	.002	.072	.062	.067	-.011	.055	.012
28	-.160*	.062	-.001	-.005	-.164*	-.022	-.144*
29	-.086	.030	.001	-.022	-.095	-.011	-.072
30	-.029	.025	.057	-.005	-.030	.028	-.048
31	-.019	-.041	.068	-.046	-.024	.031	-.045
32	-.001	-.143	.042	-.089	-.011	.013	-.025
33	-.005	-.015	.036	.007	-.009	.028	-.012
34	-.056	-.035	.009	-.016	-.063	-.004	-.072
35	-.054	-.033	-.032	.005	-.062	-.031	-.071
36	-.030	.077	.008	.094	-.038	.019	-.008
37	-.025	.079	.025	.097	-.031	.033	-.003
38	.016	.013	.108	.037	.029	.089	.021
39	.016	.040	.063	.072	.007	.094	.002
40	.011	.030	.079	.070	-.000	.104	-.005
41	-.004	-.025	.131	.014	-.012	.089	-.016
42	.020	-.036	.107	.087	.052	.113	.041
43	.005	-.041	.103	.074	.043	.108	.031
44	-.003	.014	-.048	-.037	-.003	-.052	-.006
45	.058	-.073	.065	-.023	.074	.074	.071
46	.013	-.007	.072	-.046	.023	.076	.027
47	-.055	.145*	.011	-.032	-.063	.010	-.051
48	-.055	-.056	.027	-.018	-.055	.014	-.062
49	-.006	.019	.081	.095	.001	.097	.004
50	-.020	.007	.112	.073	-.016	.118	-.014
51	-.002	-.035	.069	-.023	-.011	.051	-.013
68	-.012	.029	.037	.021	-.010	.041	-.008
69	-.080	.020	.026	.014	-.078	.029	-.077
70	.140*	.037	.097	.037	.158*	.116	.156*

The significance at the .05 level = .138, N=202

APPENDIX P-6a

CORRELATIONS OF 80 PREDICTOR VARIABLES WITH SEVEN ACCIDENT VIOLATION CRITERION VARIABLES

GROUP-NORMAL FEMALES

VARIABLES NUMBER	151	152	153	154	155	156	157
71	-.190*	-.085	-.047	-.007	-.202	-.046	-.190*
72	.130	.014	.068	.021	.147*	.085	.144*
73	.193*	.106	.078	.024	.206*	.079	.197*
74	-.080	.020	.026	.014	-.078	.029	-.077
75	-.246*	-.052	-.065	.008	-.259*	-.052	-.251*
76	.066	.039	.082	.062	.062	.094	.057
77	.063	.020	.026	.014	.064	.029	.065
78	.063	.020	.026	.014	.064	.029	.065
79	.063	.020	.026	.014	.064	.029	.065
80	.063	.020	.026	.014	.064	.029	.065
81	.063	.020	.026	.014	.064	.029	.065
82	.063	.020	.026	.014	.064	.029	.065
83	.063	.020	.026	.014	.064	.029	.065
84	.063	.020	.026	.014	.064	.029	.065
85	.063	.020	.026	.014	.064	.029	.065
86	.063	.020	.026	.014	.064	.029	.065
87	.063	.020	.026	.014	.064	.029	.065
88	.063	.020	.026	.014	.064	.029	.065
89	.063	.020	.026	.014	.064	.029	.065
90	.063	.020	.026	.014	.064	.029	.065
91	.063	.020	.026	.014	.064	.029	.065
92	.063	.020	.026	.014	.064	.029	.065
93	.063	.020	.026	.014	.064	.029	.065
94	.063	.020	.026	.014	.064	.029	.065
95	-.052	.044	.027	.008	-.058	.032	-.069
96	-.059	.068	.043	.033	-.060	.080	-.052
97	-.046	.071	.053	.041	-.050	.081	-.050
98	-.073	.066	.091	.057	-.067	.101	-.062
99	.001	.009	-.020	-.055	-.011	-.034	-.021
100	.041	.060	-.011	-.005	.023	-.010	.020
150	-.050	-.049	-.097	.039	-.101	-.080	-.097

The significance at the .05 level = .138, N=202

APPENDIX P-7

ACCIDENT VIOLATION VARIABLE

GROUP-SUMMARY OF SIGNIFICANT CORRELATIONS BETWEEN INDEPENDENT VARIABLES

WITH CRITERION VARIABLES

INDEPEND. VARIABLES	SELF REPORT. ACC.	SELF REPORT. VIOL.	STATE REPORT. ACC.	STATE REPORT. VIOL.	ACC. SELF AND STATE	VIOL. SELF AND STATE	COMBINATION ACC. AND VIOL. SELF AND STATE
	151	152	153	154	155	156	157
6		4-5	4	4-5	4	4-5	4-5
7		4		4		4	
8	3	4		4	3		
9							3
10							
11	1-2-3-5	1-2	1-2	1-2-5	1-2-3-5	1-2-5	1-2-3-6
12	14	6	13		1	3	
13				4-5			
14			6				
15			11-3	2		1-3	
16	1-2		103		1	3	1-2
17				5	5	5	4-5
18	5				5		
19	3	6	1-3		3	3	
20		5					1
21		1	1-2				1-2
22		5					
23		3					
24		3-5					1
25						6	
26							
27		5		5		5	5
28	6			1	6		6
29				4-5			
30			2				
31			2	1			
32		6		1			
33							
34		1		1-2			
35				1-2			1
36	4-5		1-2	4			
37	5			4			
38			4			4	5
39				4			
40				4		4	
41		1					
42			1-3			3	
43							
44		2-4					
45			4-5			4	
46			4-5			4-5	4-5
47		6					5
48	1-2	1-2	4-5	1-2		1-2	1-2

APPENDIX P-7a

ACCIDENT VIOLATION VARIABLE

GROUP-SUMMARY OF SIGNIFICANT CORRELATIONS BETWEEN INDEPENDENT VARIABLES

WITH CRITERION VARIABLES

	151	152	153	154	155	156	157
49			1-3	4	5	1-3	
50				4			
51		1-2	1	1-2		1-2	1-2
68			3			3	
69	3-4		3		3	3	
70	6				6		6
71	6				4-6		6
72					6	1-2	1-6
73	6				6		6
74					5		5
75	4-5-6	4-5	4	4-5	4-5-6	4-5	4-5-6
76	3				3		3
77	1-2				1-2		1-2-4
78	1-2				1-2		1-2-4
79	1-2				1-2		1-2-4
80	1-2				1-2		1-2-4
81	1-2	1	1-2	1-2	1-2	1-2	1-2
82							
83				1		1	1-2
84			5			5	
85					5		5
86			5	1	1		1-2
87							
88							
89		1-2					1
90		3					
91							
92							
93							
94							
95		1-2		1-2		1-2	
96				1-2			
97		1-2		1-2		1-2	2
98						1-2	2
99	1-2-3-5		1-2	4-5	1-2-3-5	1	1-2-3-5
100	1-2-3		1-2		1-2-3	1-2	1-2
131						4	

1 - Total E.M.R. Group
2 - Male E.M.R. Group
3 - Female E.M.R. Group
4 - Total Normal Group
5 - Male Normal Group
6 - Female Normal Group

215

APPENDIX P-8

SUMMARY OF NUMBER OF CORRELATION COEFFICIENTS

(of 80 predictors with 7 criteria)

STATISTICALLY SIGNIFICANT AT THE .05 LEVEL OF CONFIDENCE BY GROUP

GROUP	r.05	VARIABLE						
		151 A-- SR	152 V - SR	153 A - ST	154 V - ST	155 A - SS	156 AV - S	157 COMB.
1. Total EMR	.107	8	10	9	14	14	11	19
2. Male EMR	.113	10	7	7	10	9	8	16
3. Female EMR	.273	7	3	8	0	7	8	4
4. Total Normal	.094	4	5	6	13	3	8	8
5. Male Normal	.125	6	6	5	8	8	7	10
6. Female Normal	.138	5	4	1	0	6	1	7

Number of Variables by Groups

1. Significant Correlation	12	16
2. Significant Correlation	14	12
3. Significant Correlation	--	6
4. Significant Correlation	--	2
5. Significant Correlation	--	--
6. Significant Correlation	--	--
Total	26	34

APPENDIX Q

I. Partial Correlations

II. Partial Correlation Tables:

Appendix Q1 Partial Correlations-Total EMR, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in 12.3)

Appendix Q2 Partial Correlations-EMR Males, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in 12.3)

Appendix Q3 Partial Correlations-EMR Females, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in 12.3)

Appendix Q4 Partial Correlations-Total Normal, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in 12.3)

Appendix Q5 Partial Correlations-Normal Males, State Reported Accidents (Variable 153) as Criterion Variable (Variable 2 in 12.3)

Appendix Q6 Partial Correlations-Total Normal, State Reported Violation (Variable 154) as Criterion Variable (Variable 2 in 12.3)

Appendix Q7 Partial Correlations-EMR Females, State Reported Accidents or Violations (Variable 156) as Criterion Variable (Variable 2 in 12.3)

Appendix Q8 Partial Correlations-Total EMR, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in 12.3)

Appendix Q9 Partial Correlations-EMR Males, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in 12.3)

Appendix Q10 Partial Correlations-Female EMR, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in 12.3)

Appendix Q11 Partial Correlations-Total Normal, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in 12.3)

Appendix Q12 Partial Correlations-Normal Male, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in 12.3)

Appendix Q13 Partial Correlations-Normal Females, Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable (Variable 2 in 12.3)

APPENDIX Q-1

Partial Correlations - Total E.M.R.
State Reported Accidents (Variable 153) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$											
	11	12	15	16	21	36	42	49	51	81	99	100
11		-.149	-.148	-.152	-.159	-.160	-.152	-.163	-.152	-.155	-.153	-.149
12	-.107		-.108	-.116	-.113	-.122	-.126	-.128	-.115	-.111	-.105	-.112
15	-.107	-.110		-.063	-.120	-.112	-.116	-.110	-.108	-.104	-.106	-.105
16	.107	.112	.050		.116	.095	.112	.104	.102	.095	.103	.105
21	-.128	-.121	-.126	-.128		-.130	-.130	-.134	-.125	-.108	-.117	-.121
36	.123	.123	.111	.101	.123		.083	.010	.139	.120	.121	.109
42	.104	.121	.108	.110	.117	.073		.015	.083	.119	.119	.124
49	.145	.146	.129	.129	.145	.070	.081		.129	.143	.140	.133
51	-.148	-.151	-.144	-.144	-.152	-.169	-.133	-.146		-.141	-.153	-.163
81	.126	.123	.114	.112	.111	.130	.134	.134	.114		.114	.119
99	.123	-.116	-.114	-.118	-.119	-.130	-.134	-.131	-.127	-.112		-.027
100	-.135	-.139	-.132	-.137	-.140	-.136	-.154	-.140	-.155	-.136	-.073	

APPENDIX Q-2

Partial Correlations - E.M.R. Males
State Reported Accidents (Variable 153) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$							
	11	21	30	31	36	81	99	100
11		-.169	-.175	-.180	-.176	-.172	-.168	-.162
21	-.128		-.138	-.142	-.136	-.115	-.124	-.130
30	.125	.127		.048	.089	.111	.110	.107
31	.131	.131	.048		.087	.113	.114	.110
36	.121	.119	.081	.079		.115	.120	.105
81	.146	.132	.139	.141	.147		.133	.141
99	-.117	-.114	-.112	-.116	-.127	-.105		-.033
100	-.120	-.131	-.121	-.124	-.125	-.127	-.062	

APPENDIX Q-3

Partial Correlations - E.M.R. Females
State Reported Accidents (Variable (153) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$							
	12	15	16	19	42	49	68	69
12		-.392	-.426	-.357	-.492	-.477	-.396	-.290
15	-.356		-.289	-.443	.414	-.426	-.369	-.383
16	.426	.334		.438	.444	.446	.396	.545
19	-.260	-.409	-.370		-.362	-.334	-.336	-.234
42	.347	.259	.259	.236		.130	.300	.329
49	.312	.270	.254	.170	.107		.330	.279
68	-.203	-.218	-.203	-.236	-.330	-.363		.038
69	-.338	-.447	-.566	-.380	-.508	-.487	-.389	

Partial Correlations - Total Normal
State Reported Accidents (Variable 153) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$					
	6	38	45	46	48	75
6		-.098	.088	-.089	-.099	-.030
38	.101		.109	.099	.071	.100
45	.119	.133		.053	.139	.128
46	.118	.123	.048		.112	.122
48	.092	.055	.107	.072		.095
75	-.044	-.102	-.104	-.100	-.107	

APPENDIX Q-5

Partial Correlations - Normal Males
State Reported Accidents (Variable 153) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$				
	45	46	48	84	86
45		.088	.179	.151	.162
46	.051		.118	.141	.147
47	.155	.104		.122	.127
84	.163	.170	.164		.092
86	.154	.156	.147	.044	

APPENDIX Q-6

Partial Correlations - Total Normal
State Reported Violations (Variable 154) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$												
	6	7	8	13	29	36	37	39	40	49	50	75	99
6		-.146	-.141	-.134	-.148	-.135	-.133	-.143	-.140	-.140	-.140	-.025	-.149
7	-.085		-.065	-.094	-.097	-.088	-.087	-.087	-.084	-.093	-.091	-.081	-.107
8	-.064	-.050		-.081	-.100	-.073	-.071	-.071	-.066	-.080	-.076	-.066	-.093
13	.076	.103	.101		.115	.081	.079	.078	.073	.083	.079	.085	.111
29	-.084	-.093	-.104	-.102		-.096	-.097	-.104	-.103	-.102	-.102	.094	-.103
36	.097	.114	.111	.100	.124		.043	.076	.071	.071	.072	.110	.116
37	.102	.120	.117	.105	.130	.059		.083	.077	.080	.082	.115	.122
39	.098	.104	.101	.086	.122	.062	.058		.012	.059	.061	.112	.111
40	.103	.110	.105	.092	.128	.069	.064	.043		.071	.071	.115	.119
49	.077	.095	.092	.074	.108	.010	.003	.025	.020		.023	.098	.099
50	.076	.092	.088	.076	.107	.010	.000	.023	.011	.017		.093	.100
75	-.098	-.172	-.171	-.168	-.181	-.173	-.171	-.179	-.176	-.179	-.177		-.177
99	-.099	-.114	-.109	-.109	-.113	-.098	-.098	-.102	-.103	-.105	-.107	-.099	

APPENDIX Q-7

Partial Correlations - E.M.R. Females
State Reported Accidents or Violations (Variable 156) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$							
	12	15	16	19	42	49	68	69
12		-.392	-.426	-.357	-.492	-.477	-.396	-.290
15	-.356		-.289	-.443	-.414	-.426	-.369	-.383
16	.426	.334		.538	.444	.446	.396	.545
19	-.260	-.409	-.370		-.362	-.334	-.336	-.234
42	.347	.259	.259	.236		.130	.300	.329
49	.312	-.270	.254	.170	.107		.330	.279
68	-.203	-.218	-.203	-.236	-.330	-.363		-.038
69	-.338	-.447	-.566	-.380	-.508	-.487	-.389	

APPENDIX Q-8

Partial Correlations - Total E.M.R.
Combined Accidents and Violations, Self and State (Variable #157) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$																		
	11	16	20	21	24	35	48	51	72	77	78	79	80	81	83	86	89	99	100
11		-.231	-.235	.237	-.236	-.236	-.221	-.231	-.251	-.239	-.235	-.239	-.239	-.236	-.23[illegible]	-.240	-.238	-.243	-.22[illegible]
16	.1[illegible]5		.141	.154	.149	.138	.152	.142	.132	.140	.139	.140	.140	.125	.137	.144	.148	.138	.14[illegible]
20	-.118	-.102		-.054	-.078	-.097	-.111	-.105	-.097	-.103	-.098	-.103	-.103	-.091	-.101	-.100	-.100	-.090	-.104
21	-.127	-.125	-.064		-.080	-.113	-.115	-.119	-.106	-.103	-.101	-.103	-.103	-.095	-.106	-.113	-.111	-.109	-.115
24	.123	.116	.083	.077		.100	.105	.102	.114	.103	.101	.103	.103	.101	.113	.113	.109	.110	.114
35	-.128	-.109	-.108	-.118	-.108		-.084	-.066	-.115	-.116	-.119	-.116	-.116	-.097	-.106	-.110	-.112	-.118	-.120
48	-.105	-.131	-.126	-.125	-.119	-.091		-.069	-.139	-.118	-.119	-.118	-.118	-.125	-.124	-.126	-.128	-.137	-.152
51	-.116	-.112	-.114	-.122	-.108	-.062	-.055		-.127	-.103	-.104	-.103	-.103	-.106	-.109	-.112	-.117	-.124	-.138
72	-.159	-.107	-.114	-.117	-.126	-.120	-.139	-.134		-.102	-.104	-.102	-.102	-.127	-.126	-.127	-.131	-.120	-.126
77	.1[illegible]7	.139	.141	.136	.138	.142	.139	.134	.126		.001	.003	.003	.125	.140	.140	.145	.143	.146
78	.157	.146	.144	.143	.144	.152	.147	.142	.136	.047		.047	.047	.127	.143	.144	.147	.147	.152
79	.157	.139	.141	.136	.138	.142	.139	.134	.126	.003	.001		.003	.125	.140	.140	.145	.143	.146
80	.157	.139	.141	.136	.138	.142	.139	.134	.126	.003	.001	.003		.125	.140	.140	.145	.143	.146
81	.193	.172	.178	.177	.182	.175	.188	.181	.189	.173	.168	.173	.173		.152	.132	.177	.171	.183
83	.135	.119	.122	.121	.129	.117	.128	.121	.130	.123	.118	.123	.123	.064		.045	.121	.122	.139
86	.151	.135	.130	.135	.137	.129	.138	.133	.139	.132	.128	.132	.132	.026	.065		.129	.127	.167
89	.125	.114	.103	.108	.108	.103	.115	.110	.118	.111	.104	.111	.111	.092	.102	.101		.083	.098
99	-.209	-.201	-.198	-.204	-.206	-.206	-.214	-.211	-.204	-.206	-.203	-.206	.206	.192	-.203	-.201	-.194		-.102
100	-.182	-.184	-.185	-.188	-.188	-.189	-.189	-.188	-.207	-.201	-.188	-.188	-.188	-.183	-.195	-.211	-.180	-.050	

225

APPENDIX Q-9

Partial Correlations - E.M.R. Males
Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$															
	11	16	121	48	51	77	78	79	80	81	83	86	97	98	99	100
11		-.233	-.233	-.218	-.226	-.234	-.229	-.234	-.234	-.238	-.235	-.242	-.231	-.234	-.234	-.225
16	.138		.147	.138	.130	.130	.129	.130	.130	.114	.128	.132	.127	.137	.129	.133
21	-.114	-.122		-.109	-.115	-.100	-.098	-.100	-.100	-.097	-.106	-.110	-.102	-.125	-.107	-.116
48	-.119	-.144	-.142		-.094	-.139	-.141	-.139	-.139	-.144	-.143	-.143	-.138	-.152	-.148	-.163
51	-.101	-.106	-.119	-.039		-.102	-.103	-.102	-.102	-.108	-.111	-.112	-.108	-.120	-.118	-.130
77	.152	.141	.141	.145	.138		.002	.003	.003	.126	.142	.138	.137	.146	.141	.148
78	.154	.151	.150	.156	.150	.056		.056	.056	.130	.148	.145	.142	.158	.148	.157
79	.152	.141	.141	.145	.138	.003	.002		.003	.126	.142	.138	.137	.146	.141	.148
80	.152	.141	.141	.145	.138	.003	.002	.003		.126	.142	.138	.137	.146	.146	.148
81	.186	.161	.169	.179	.173	.160	.153	.160	.160		.149	.127	.135	.173	.164	.177
83	.121	.103	.110	.115	.111	.106	.099	.106	.106	.060		.036	.041	.111	.109	.129
86	.146	.123	.128	.129	.127	.117	.112	.117	.117	.031	.069		.085	.123	.124	.166
97	.115	.104	.109	.110	.110	.101	.092	.101	.101	.001	.047	.064		.111	.124	.130
98	-.115	-.112	-.126	-.123	-.117	-.108	-.112	-.108	-.108	-.104	-.108	-.105	-.105		-.118	-.073
99	-.186	-.178	-.182	-.187	-.186	-.178	-.175	-.178	-.178	-.171	-.180	-.180	-.188	-.188		-.085
100	-.162	-.168	-.175	-.188	-.182	-.171	-.170	-.171	-.171	-.171	-.181	-.201	-.181	-.150	-.053	

226

APPENDIX Q-10

Partial Correlations - Female E.M.R.
Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$			
	9	11	76	99
9		-.230	-.015	-.283
11	-.210		-.224	-.262
76	-.235	-.333		-.353
99	-.289	-.285	-.277	

APPENDIX Q-11

Partial Correlations - Total Normal
Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$							
	6	17	46	75	77	78	79	80
6		-.168	-.160	-.041	-.164	-.164	-.164	-.164
17	-.095		-.101	-.084	-.099	-.099	-.099	-.099
46	.079	.101		.084	.093	.093	.093	.093
75	-.192	-.246	-.246		-.248	-.248	-.248	-.248
77	.086	.098	.092	.090		.002	.002	.002
78	.086	.098	.092	.090	.002		.002	.002
79	.086	.098	.092	.090	.002	.002		.002
80	.086	.098	.092	.090	.002	.002	.002	

228
207

APPENDIX Q-12

Partial Correlations - Normal Male
Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$									
	6	17	27	38	46	47	74	75	85	99
6		.176	-.180	-.174	-.170	-.188	-.175	-.006	-.186	-.171
17	-.174		-.175	-.183	-.179	-.185	-.169	-.155	-.182	-.193
27	-.122	-.116		-.125	-.131	-.132	-.121	-.135	-.129	-.136
38	-.123	-.137	-.135		-.135	-.126	-.130	-.122	-.128	-.135
46	.104	.119	.129	.124		.055	.124	.121	.145	.125
47	.149	.146	.147	.133	.088		.152	.141	.153	.152
74	.121	-.114	-.128	-.126	.132	-.143		-.100	-.136	-.135
75	-.155	-.219	-.242	-.231	-.236	-.237	-.222		-.232	-.229
85	.125	.122	.124	.112	.142	.134	.125	.109		.113
99	-.117	-.149	-.144	-.134	-.136	-.145	-.138	-.117	-.127	

APPENDIX Q-13

Partial Correlations - Normal Females
Combined Accidents and Violations, Self and State (Variable 157) as Criterion Variable
(Variable 2 in $r_{12.3}$)

Variable 1 in $r_{12.3}$	Variable 3 in $r_{12.3}$						
11		-.122	-.097	-.082	-.100	-.083	-.007
28	-.127		-.128	-.133	-.132	-.129	-.126
70	.119	.141		.045	.061	.023	.094
71	-.153	-.182	-.118		-.126	-.028	-.145
72	.106	.132	.000	.016		.034	.089
73	.162	.186	.124	.060	.140		.146
75	-.211	-.241	-.219	-.220	-.225	-.214	

REFERENCES

Accident Facts, National Safety Council, 425 N. Michigan Avenue, Chicago, Illinois, 60611, 1969.

Barrett, C. V., and C. L. Thorton. "Relationship Between Perceptual Style and Driver Reaction to an Emergency Situation", Journal of Applied Psychology, LXII (April, 1968), 169-176.

Beamish, Jerome J., and James L. Malfetti. "A Psychological Comparison of Violator and Non-Violator Automobile Drivers in the 16 to 19 Year Age Group", Traffic Safety Research Review, (March 1962), 12-15.

Bender, Lauretta. A Visual Motor Gestalt Test and Its Clinical Use. Published by the American Orthopsychiatric Association, New York, 1938.

Benton, J. L., et al. "Auto Driver Fitness: An Evaluation of Useful Criteria", Journal of American Medical Association, (May 6, 1961), 176:419.

Brazell, Robert E. A Comparison of Various Behind the Wheel Training Methods. (Safety and Traffic Division of the Automobile Club of Michigan, 1962), p. 24.

Carlson, W. L. and Klein. "Familial vs. Institutional Socialization of the Young Traffic Offender", Journal of Safety Research, March 1970, Vol. 2, No. 1, pp. 13-25.

Conger, J. J., et al. "Psychological and Psycho-Physiological Factors in Motor Vehicle Accidents", Journal of American Medical Association, (April 4, 1959), 169:158.

Conger, John J. "Personal and Interpersonal Factors in Motor Vehicle Accidents", American Journal of Psychiatry, (June, 1957), 113: 1069-74.

Corbally, John E., and Mark M. Kroll. "The Relationship of Scholastic Achievement to Traffic Citations in the Seattle Public Schools", (December, 1960), 18-21.

Dawson, W. W. "Stereoscopic Perceptual Deficit of Mentally Retarded Adults", American Journal of Mental Deficiency, (1967), 964-968.

Drissen, Gerald. "The Fallacy of the Untrained Driver", Traffic Safety, (March, 1969).

Egan, Robert E. "Should the Educable Mentally Retarded Receive Driver Education", Journal of Exceptional Children, (January, 1967), 323.

Gallagher, J. R. and R. C. Moore. "Causes of Accidents of Adolescent Drivers", Journal of Traffic Safety, (1969).

Goldstein, Leon G. "Whitler Accidents", Journal of Traffic Safety, (March, 1963), 2-4.

Guttshall, R. C. Harper and D. Burke. "An Exploratory Study of the Interrelations Among Driving Ability, Driving Exposure, and Socioeconomic Status of Low, Average and High Intelligence Males", Journal of Exceptional Children, (September, 1968), 43-48.

Guttshall, W. "Can He Be Taught To Drive", Safety Education, (November, 1963).

Heath, Earl Davis. "The Relationship Between Driving Records, Selected Personality, Character and Biographical Data of Traffic Offenders", Doctor's Thesis, New York University, (1958).

Heimstra, N. W., V. S. Ellingstad, and H. R. DeKock. "Effects of Operator Mood on Performance in a Simulated Driving Task". (This research was done at the University of Vermillion in South Dakota, contract number AC-00188-02, Public Health Service/ Inquiry Control Program, Accident Prevention), (1967).

Howe, L. E. "A Comparison of Motor Skills of Mentally Retarded and Normal Children", Journal of Exceptional Children, (1959), 352-354.

Kahn, C. H. "Teaching Driver Education to Mentally Retarded Adolescents", Exceptional Children. (1955), 17-19.

Kenel, Francis C., and Emily H. Krueger. A Driver Education Manual for High School Educable Mentally Retarded Students, Division of Curriculum Revision, Milwaukee Public Schools, 1969.

Klein, D. "The Teenaged Driver: A Research Parodigm", Traffic Quarterly, (January, 1968), 22 (1): 97-108.

Kole, T., and Henderson, H. L. "Cartoon Reaction Scale with Special Reference to Driving Behavior", Journal of Applied Psychology, (1966), 311-316.

Kraus, H. W., R. Steele, W. R. Ghent, and M. G. Thompson. "Pre-Driving Indentification of Young Drivers with a High Risk of Accidents". Journal of Safety Research, June, 1970, Vol. 2, No. 2, 55-66.

Malfetti, J. L. "Traffic Safety and the Adolescent Driver", Journal of School Health, (1960), 228-234.

McPherson, Kenard, and Philip O'Leary. "Driver Education for Educable Mentally Retarded Students", Traffic Safety, (March-April, 1969), 18-22.

McPherson, Kenard, and Francis C. Kenel. "Perception of Traffic Hazards: A Comparative Study", Research Review, (June, 1968), 46-49.

National Educational Association Research Division. A Critical Analysis of Driver Education Research. Washington, D. C., (NEA), 1956, 60.

News, Insurance Information Institute, 110 William Street, New York, New York, 10038, (February 16, 1970).

Pappanikow, A. J. and Peter W. Bowan. "Driver Education, Asset or Liability", American Journal of Mental Deficiency, (1959) 662-666.

Pappanikow, A. J. and Peter W. Bowan. "First Results of a Residential School Driver Education Program", American Journal of Mental Deficiency, (September, 1960), 194-198.

Pascal, G. R. and Barbara J. Suttell. The Bender-Gestalt Test published by Grune and Stratton, New York, New York, (1951).

Pelz, Donald C. "Who are the Dangerous Drivers"? Analogy, (1968) 13-15.

Powell, Lenore. "Should the EMH Student Be Taught To Drive"? The Idea, (May, 1968) 5-6.

Ribicoff, Abraham. "You Drive as You Live", Analogy, (1967), 16-18.

Ross, H. L. Traffic Safety Research Review, (September, 1960).

Schuman, S. H., D. C. Pelz, N. J. Ehrlich and M. L. Suzer. "Young Male Drivers: Impulse Expression, Accidents, and Violations", Journal of American Medical Association. (1967).

Stratemeyer, Clara G. Washington, D. C.: National Commission on Safety Education, NEA, 1201 16th St., N. W., Accident Research For Better Safety Teaching, (1964).

Tillman, W. A. and G. E. Hobbs. "The Accident Prone Automobile Driver: A Study of the Psychiatric and Social Background", American Journal of Psychiatry, (1949).

The Travelers, 1970 Book of Street, Highway and Interstate Accident Facts, The Travelers Insurance Company, Hartford, Connecticut, (1970).

Walker, Helen M. and Joseph Lev. Elementary Statistical Methods, Holt Company, New York, New York, (1958) 302.

Williams, G. J. and B. Little. "Driver Education for the Educable Mentally Retarded", New York State Education, (1966), 12-31.